FISHERY RESEARCH BULLETIN 88-04

Feasibility of Using Scale and Tag Data to Estimate Origins of Chinook Salmon Harvested in Southeast Alaska Fisheries in 1982

by

Benjamin W. Van Alen

Alaska Department of Fish and Game
Division of Commercial Fisheries
PO Box 3-2000
Juneau, Alaska 99802

May 1988

State of Alaska

Steve Cowper, Governor

The Fishery Research Bulletin Series was established in 1987, replacing the Informational Leaflet Series. This new series represents a change in name rather than substance. The series continues to be comprised of divisional publications in which completed studies or data sets have been compiled, analyzed, and interpreted consistent with current scientific standards and methodologies. While most reports in the series are highly technical and intended for use primarily by fishery professionals and technically oriented fishing industry representatives, some nontechnical or generalized reports of special importance and application may be included. Most data presented are final. Publications in this series have received several editorial reviews and usually two *blind* peer reviews refereed by the division's editor and have been determined to be consistent with the division's publication policies and standards.

FEASIBILITY OF USING SCALE AND TAG DATA TO ESTIMATE ORIGINS OF CHINOOK SALMON HARVESTED IN SOUTHEAST ALASKA FISHERIES IN 1982

By

Benjamin W. Van Alen

Fishery Research Bulletin No. 88-04

Alaska Department of Fish and Game
Division of Commercial Fisheries
Juneau, Alaska

May 1988

AUTHOR

Benjamin W. Van Alen is a Research Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries, Southeast Region, P.O. Box 20, Douglas, AK 99824.

ACKNOWLEDGMENTS

John H. Clark and Scott Marshall instigated this investigation. Debbie Hicks digitized the scales used in this analysis. The success of this work can largely be contributed to her scale reading skills and perfectionism. I thank Robert Conrad for his assistance with variance calculations and for development of the microcomputer based discriminant programs used for analysis of scale pattern data. I am particularly grateful to Scott Marshall for his guidance and extensive review of this document. I thank Kate Myers and Ken Bruya (Fisheries Research Institute, University of Washington) and Yvonne Yole (Canadian Department of Fisheries and Oceans, Vancouver) for their assistance in obtaining scale samples from runs to British Columbia, Washington, and Oregon. Lastly, I thank Mindy Rowse and Mark Olsen for their assistance in finalizing tables and figures.

PROJECT SPONSORSHIP

This investigation was partially financed by the Anadromous Fish Conservation Act (P.L. 89-304 as amended) under Project Numbers AFC-66 and AFC-72.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF TABLES (Continued)

LIST OF FIGURES

LIST OF FIGURES (Continued)

LIST OF APPENDICES

LIST OF APPENDICES (Continued)

LIST OF APPENDICES (Continued)

LIST OF APPENDICES (Continued)

ABSTRACT

Based on analysis of age composition, scale pattern, and coded microwire tag data a method was developed which enabled chinook salmon (*Oncorhynchus tshawytscha*) harvested in Southeast Alaska commercial fisheries during 1982 to be assigned to Alaska hatchery, Alaska wild (including transboundary runs), and non-Alaska (British Columbia, Washington, Oregon, Idaho) origins. Coded microwire tag data was used to estimate the harvest of Alaskan hatchery fish. All fish aged 0. and not assigned to an Alaska hatchery were attributed to productions outside of Alaska because such fish are rare in the Southeast Alaska escapements. The remaining age-1. and age-2. fish were assigned to Alaska or non-Alaska origin based on analysis of scale patterns using a linear discriminant function. The mean proportion correctly classified was 0.811 and 0.886 for fish aged 1.2 and 1.3, respectively, in 3-way Alaska-British Columbia-Washington/Oregon models and 0.869 for fish aged 1.4 in a 2-way Alaska versus non-Alaska model. I estimated that 175 thousand or 77% of the 228.5 thousand chinook salmon harvested during the 1982 summer troll fishery originated from streams outside of Alaska. A higher fraction (81%) of the fish harvested in the winter troll fishery from 8 March to 14 April were of non-Alaska origin. The District 104 seine fishery had the highest incidence of non-Alaska chinook (95%), while the District 101 and 111 gill net fisheries had the lowest (33%). The contribution of fish from Alaskan hatcheries was small (<1%). The abundance of Alaska chinook declined through the summer and was highest in inside waters. My analysis supports the hypothesis that some Alaskan fish rear in the Southeast Alaska Archipelago, while others do not.

KEY WORDS: Chinook salmon, age composition analysis, scale pattern analysis, linear discriminant function analysis, coded microwire tag analysis, stock identification, Southeast Alaska, regional stock composition estimates

INTRODUCTION

Chinook salmon (*Oncorhynchus tshawytscha*) are a valued and limited resource along the west coast of North America. Stocks originating from California to Alaska have been shown to contribute to the fisheries of Southeast Alaska. Disputes over the contribution of local stocks and subsequent conservation and economic impacts of Southeast Alaska fisheries on west coast chinook stocks have existed for years. One point of contention between fishery agencies in the development of management plans under the auspices of the North Pacific Management Council and more recently the Pacific Salmon Fisheries Commission has been the contribution that Alaskan stocks make to the fisheries of Southeast Alaska.

Adult tagging studies have documented the highly mixed stock nature of Southeast Alaska's chinook salmon harvests. Based on adult tagging in 1950-1952, Parker and Kirkness (1956) concluded that the troll fishery operating in outside waters of Southeast Alaska harvests fish from Oregon to Alaska and that the Columbia and Fraser River stocks were the major contributors. Kissner (1977) compiled adult tag data from 1950-1955, including that of Parker and Kirkness (1956), and concluded that fish from Oregon, Washington, and British Columbia dominate the harvest in the outside waters and that, in the inside waters, fish from Alaska and British Columbia dominate the harvest. While important in delineating the geographic extent of contributions, failure to tag in all areas, to standardize recovery, and to tag in proportion to abundance precludes the quantitative use of this tagging data.

Recoveries of tagged (CWT) fish reported by Davis et al. 1979; Funk 1981; Johnson 1985; Clark et al. 1985; and Marshall and Clark 1986 provided estimates of the contribution of many hatchery stocks. Funk (1981) showed that when sufficient recoveries are made, CWT data allows reasonable temporal and spatial analysis of contribution rates for release groups. However, because all stocks that contribute to the fishery are not represented by a tag code, additional methods were needed for other stocks. An effort is currently being made, however, to design a coastwide indicator stock tagging program that may be useful in this regard (Chinook Technical Committee 1987).

Kissner (1973, 1974, 1975, 1976, and 1977) used age composition and scale circuli count data to estimate the contribution of Alaskan stocks to selected sport and commercial fisheries for the years 1972 to 1976. By comparing scale circuli counts from major spring chinook salmon runs to Alaska (Alsek, Taku, Stikine, and Chilkat) and non-Alaska (Nass, Skeena, Fraser, and Columbia) rivers, he found that the number of circuli from the focus to the first freshwater annulus increased in samples from north to south. Kissner used simulated sampling (boot strapping) of the theoretical probability distributions of circuli counts from the Alaska and non-Alaska standards to estimate the proportion, to the nearest 10%, of Alaskan and non-Alaskan fish present in fishery samples. Kissner used this circuli count data to estimate the harvest of Alaskan chinook salmon in the Fairweather Grounds and Ketchikan Area troll fisheries, Juneau and Sitka Area sport catches, and for immatures harvested in the Taku Inlet (District 111) gill net fishery.

Kissner (1973) concluded that Alaskan chinook salmon were nearly all *spring chinook* (age-1.) and that *fall chinook* (age-0.) originate from non-Alaskan rivers. Estimates of the maximum contribution of Alaskan fish to several sampled sport and commercial fisheries were also made by Kissner (1974, 1975, 1976, and 1977) based on age composition or combined age composition and circuli count data.

In this paper I expand on Kissner's methodology and use a combination of age composition (AWL) analysis, scale pattern analysis (SPA), and coded microwire tag (CWT) analysis to estimate the contributions of Alaskan fish to the regions 1982 commercial harvests. I use SPA in a linear discriminant function to discriminate between Alaskan, British Columbia, and Washington/Oregon spring chinooks. I also evaluate the feasibility of using SPA to identify spring chinooks from Alaskan hatcheries. The abundance by time and area of Alaska and non-Alaska fish in Southeast Alaska waters was evaluated using catch per effort data.

METHODS

Overview

I estimated the harvest, by time and area, of chinook salmon originating from Alaskan wild and hatchery runs and non-Alaskan runs in the 1982 Southeast Alaska summer troll, District 104 seine, and Districts 101 and 111 gill net fisheries, and the 8 March to 14 April period of the winter troll fishery (Figures 1 and 2). Estimates were based on coded microwire tag, age composition, and scale pattern analyses (Figure 3). For purposes of this report, the Alaska wild group consists of fish which originated from Alaska and Alaska/British Columbia transboundary rivers (Alsek, Taku, and Stikine Rivers). The non-Alaska region consists of fish which originated from rivers and hatcheries in British Columbia, Washington, Oregon, and Idaho (Figure 1).

I used CWT data reported by Clark et al. (1985) and summarized in Appendix A to estimate the contribution of Alaskan hatchery chinook. The contribution of fish aged 0. and 1. were estimated separately for each strata.

All fish caught were classified into two groups, age 0. and age >0., based on age determinations from scales representative of the catch (Van Alen and Wood 1983). Since few age-0. fish are present in Alaska escapements (Kissner 1973; McBride and Wilcock 1983; Van Alen and Wood 1983; Healey 1983), the age-0. fish were either: (1) of Alaskan hatchery origin, as estimated by CWT analysis, or (2) of non-Alaska wild and hatchery origin. Age-0. fish are present in some Yakutat Area rivers and in a few of the shorter/coastal Alaskan rivers. Considering the relatively small proportion of age-0. fish in the Alaskan escapements, disregarding these fish was felt to cause no more than negligible bias to our estimates of regional contributions; i.e., less than 1% of all the fish sampled from 1981 to 1985 were age-0. (Van Alen and Wood 1983, Van Alen et al. 1986, Van Alen and

Olsen 1986, Van Alen et al. 1987, McGregor and Van Alen 1987), and the escapement of Alaskan wild stocks compared to other escapements was relatively small (Myers and Rogers 1983).

I used linear discriminant function analysis of scale patterns to estimate the harvest of age-1., age-2., and age-3. fish of Alaska wild or non-Alaska wild and hatchery runs (Figure 3). Separate three-way, age/brood year specific, Alaska wild versus British Columbia versus Washington-Oregon SPA models were constructed for fish aged 1.2 and 1.3. Fish aged 1.4 were classified to Alaska wild or non-Alaska (British Columbia-Washington-Oregon) origin in a two-way SPA model. Pooling British Columbia samples with Washington/Oregon samples was necessary since there were to few fish aged 1.4 in the Washington and Oregon escapements to provide sufficient scale samples for analysis. The few fish aged 1.1 in the catches were assigned to either Alaska wild or non-Alaska origins based on the combined age-1.2, age-1.3, and age-1.4 mixing proportions. I chose to classify fish aged 1.1 with the combined mixing proportions since the age at which these fish were destined to mature was unknown. I classified the few remaining fish aged 1.5, 2., and 3. based on the age-1.4 SPA model since these age classes were only observed in Alaska and British Columbia escapements, the principal groups represented in this two-way model. Age-pooled models were also constructed to evaluate between year variability in scale patterns. All models were constructed using data collected in 1982.

Since only Alaskan wild and non-Alaskan groups were represented in these SPA models, I had to correct the SPA estimates for the few age-1. Alaskan hatchery fish present in the catch. To do this, I classified known origin Alaskan hatchery fish in the separate age-1.2, age-1.3, and age-1.4 Alaska wild versus non-Alaska SPA models to determine the proportion classified to each group. I then subtracted the number of "misclassified" Alaska hatchery fish from the Alaska wild and non-Alaska totals estimated by SPA to provide corrected totals for these two groups.

The feasibility of using scale pattern analysis to estimate the harvest of Alaskan hatchery age-1. chinook was investigated (Appendix C); however, the model accuracies were not high enough to yield accurate estimates. The CWT data was believed to be the best estimator for the contribution of Alaskan hatchery fish.

Scale Collection and Processing

Scales were sampled from the preferred area above the lateral line (INPFC 1963), mounted on gum cards, and impressions made in cellulose acetate (Clutter and Whitesel 1956). Age determinations were based on examination of scales under moderate (40 - 70X) magnification. The criteria for determining age was described in Van Alen and Wood (1983). The accuracy of age determinations was untested. However, age validations of known aged coded microwire tagged hatchery origin chinook have ranged between 75 and 80% (Van Alen et al. 1987). Ages are reported in European notation, where the number of freshwater annuli (winters) are separated by a decimal from the number of marine annuli. The fishes total age is the sum of the two numbers plus one for the winter spent in the gravel as an egg/alevin.

Scales were measured or "digitized" according to zones that parallel the age of the fish. Scale impressions were projected onto a digitizing tablet at 100X magnification using equipment similar to that described by Bilton (1970) and modified by Ryan and Christie (1976). Measurements were made along a line starting at the focus with an angle approximately 20 degrees from the long axis and perpendicular to the sculptured field. The distance between each circulus in each of three scale growth zones (Figure 4) was recorded.

The three scale zones were: (1) scale focus to outside edge of the freshwater annulus (freshwater annular zone), (2) outside edge of the freshwater annulus to the last circulus of freshwater growth (freshwater plus growth zone), and (3) the last circulus of freshwater growth to the outer edge of the first ocean annulus (first marine annular zone). Seventy five scale characters, scale variables 1 to 30, 61, 62, 65 to 68, and 70 to 108, were then calculated from these incremental distances and circuli counts (Table 1). One person digitized all the scales used in this analysis.

Development of Regional SPA Standards

Scale data used to construct the regional standards was obtained from the major spring chinook runs to Southeast Alaska, British Columbia, Washington, and Oregon (Tables 2 and 3, Figure 1). The geographic range of stocks included in the models was based on the origins of tagged (CWT) fish recovered in Southeast Alaska (Clark et al. 1985), on the results of adult tagging studies by Parker and Kirkness (1956), and on the age compositions of the runs to each region (Appendix B.1 and B.2).

The age compositions of the runs to British Columbia, Washington, and Oregon were evaluated based, in part, on data compiled by Myers and Rogers (1983) and, for the Alaskan runs, on data compiled by Van Alen and Wood (1983). While the age compositions of escapements may not accurately reflect the total run, these data were the best estimators available.

The Alaska scale standard consisted of samples from the Alsek, Taku, Stikine, Chilkat, Keta, and Unuk Rivers. These Alaskan and transboundary river samples were obtained primarily by sampling carcasses on the spawning ground. Fish from Andrew's Creek were sampled as they passed through a weir; Chilkat River fish were sampled from upper Chilkat Inlet sport fishery catches occurring on 29 to 31 May and 5 to 6 June.

The British Columbia scale standard consisted of samples from the Nass, Skeena, Bella Coola, and Fraser Rivers and from several inshore and terminal area fisheries. The samples from the British Columbia Rivers were from lower river test fisheries on the Skeena and Fraser Rivers and from terminal area gill net catches on the Nass and Skeena Rivers.

The Washington-Oregon scale standard consisted of samples from spring runs to the Stillaguamish and Columbia Rivers and to some Oregon coastal rivers. The Stillaguamish and Columbia Rivers were the only rivers in the Washington-Oregon region with appreciable numbers of age-1. fish (Appendix

B.2). The Stillaguamish samples were obtained from a terminal area gill net fishery and the Columbia River samples were collected from the Corbett and Woody Island in-river test gill net fisheries. These test fisheries catch chinook salmon destined to natural spawning areas and hatcheries in Washington, Oregon, and Idaho.

The desired sample size for each group in a model was 200 scales. Abundance data by age was used to weight the proportion of the individual runs included in each groups standard. The desired and actual available sample sizes for each run by age class are listed in Table 2 for the Alaskan group and in Table 3 for the non-Alaskan group(s). When the number of scales from a particular run was less than desired, all available scales from the run were used.

The Alaska hatchery scale standard consisted of samples from returns to Little Port Walter and Deer Mountain hatcheries. The age-1.2 standard consisted of 22 samples from Little Port Walter and 40 from Deer Mountain, the age-1.3 standard consisted of 30 from Little Port Walter and 36 from Deer Mountain, and the age-1.4 standard consisted of 24 from Little Port Walter.

Discriminant Analysis

Linear discriminant functions (Fisher 1936) were built and evaluated using scale measurements from fish of known origin. Subsequently these models were applied to scale measurements from fish sampled from commercial catches. Scale pattern variables were added in a stepwise procedure with the partial F-statistic set at 4.0 (Enslein et al. 1977). We used the leaving-one-out procedure to evaluate classification accuracy for the linear discriminant functions (Lachenbruch 1967). The average classification accuracy of these models were calculated as the unweighted means of the accuracies along the proportion correct diagonal of the decision array. The model with the highest average classification accuracy was used. Adjustments for misclassification rates between groups was made using the procedure of Cook and Lord (1978). If negative values were obtained for the proportional contribution of a group following this procedure, a second model was constructed with the group excluded. Variances for estimates were computed according to Pella and Robertson (1979).

Coded Microwire Tag Analysis

Estimates of the contribution of Alaskan hatchery fish has been extracted from Clark et al. (1985) and summarized here in Appendix A. An estimate of the Alaskan hatchery contribution was possible because all release groups were represented by a tag code. The number of fish recovered of each release group was estimated from the proportion of the catch sampled, and an estimate of the mark/unmark ratio in the release. The number of recovered tags were adjusted for tag loss and unreadable tags as well as for fish heads lost during the sampling process.

The estimated number of fish of the release group identified by a specific tag code and harvested in the stratum of interest was computed by:

$$\hat{C}_R = \frac{N}{n_2} * \frac{a_1}{a_2} * \frac{m_1}{m_2} * \frac{m_c}{\theta}$$

where: $\hat{C}_R$ = estimated number of release group harvested in the stratum of interest;
N = number of fish caught in stratum of interest;
n_2 = number of fish sampled in stratum of interest;
a_1 = number of fish observed without adipose fins;
a_2 = number of heads received by the tag lab;
m_1 = number of tags detected;
m_2 = number of tags decoded;
m_c = number of tags of the specific code found in the stratum of interest; and
θ = proportion of fish tagged of a given release group (total number of tags inserted less tag loss and mortalities of tagged fish divided by the total number of tagged and untagged fish).

The ratio N/n_2 expands for the proportion of catch not sampled; the ratio a_1/a_2 adjusts for heads lost; and the ratio m_1/m_2 adjusts for tag loss in the lab, and the ratio M_c/θ expands for the proportion of the release group not tagged. The correction for head loss apportions adipose clips which were seen in the samples from a given time-area stratum, but for which no tag code could be assigned, back to tag codes actually found in the stratum based on the proportions of each tag code successfully decoded in the stratum. The same is true for the correction for tag loss in the lab. Only those tags recovered during the conduct of the sampling program (random recoveries) were used in our analysis.

Strata Definition for Fishery Samples

The time and area strata used in the regional classification of the troll data was based on the strata used by Van Alen and Wood (1983) in presenting the age compositions of the 1982 catches. Sampling of the troll catch was done to accurately describe the age composition of the harvest in each of four areas (Figure 2). The number of temporal strata was dependent on available sample sizes. Age-1. fish harvested in the Northern Outside Area during the 2nd, 4th, 6th, and 8th weeks of the 9-week summer troll season were classified to stock of origin based on linear interpolations of SPA estimates for adjacent weeks.

Small catches and limited scale samples precluded estimation of regional contribution in all but the District 104 seine and pooled District 101 and 111 gill net fishery. Appendix B.3 and B.4 summarize age compositions not presented in Van Alen and Wood (1983) for the winter troll, District 104 seine, and Districts 101 and 111 gill net harvests.

Catch Per Effort Analysis

The relative abundance of Alaskan and non-Alaskan chinook salmon by time and quadrant area was evaluated using catch-per-boat-day data collected from the 1982 summer troll fishery as part of the Troll Fishery Performance Data (FPD) project (J. Kelly, Alaska Department of Fish and Game, Division of Commercial Fisheries, Sitka, personal communication). Days fished were standardized between power and hand troll gear. I calculated the summer troll effort (boat days), by area and period, using the following formula:

$$B_f = \frac{C_f * B_s}{C_s}$$

where: B_f = Number of boat days the fleet fished in strata;
C_f = Catch of chinook salmon by fleet in strata (from fish ticket data);
B_s = Number of boat days fished by sampled vessels (from FPD data); and
C_f = Catch of chinook salmon by sampled vessels (from FPD data).

The FPD data was initially summarized by six areas (Appendix E.1 and E.2). I summed boat days sampled and number of chinook sampled across areas and weeks to calculate chinook catch per boat day corresponding to the quadrant areas and periods used in this study for summarization of stock composition (Appendix E.3). For the Northern Outside area I summed FPD Areas 1 and 2. For the Northern Inside Area I summed FPD Area 4 with the average of FPD Areas 4 and 5. For the Southern Inside Area I summed FPD Area 6 with the average of FPD Areas 5 and 6. The FPD data for District 114 was included in the Northern Inside area since it was included in FPD Area 4.

RESULTS

Age Composition Analysis

There were differences in the age compositions of fish harvested by gear type, area, and time (see Van Alen and Wood, 1983, for tabular and graphical presentation of this data). Age-0. fish comprised 58% and 55% of the winter and summer troll harvest, respectively, 82% of the District 104 purse seine harvest, and 13% of the combined Districts 101 and 111 gill net harvest. The proportion of age-0, fish harvested was higher in the outside areas than in the inside areas (X^2 = 798, df = 1, P<.001 for the winter troll fishery and X^2 = 2708, df = 1, P<.001 for the summer troll fishery). The proportion of age-0. fish increased through time in the summer troll fishery (X^2 = 169.5, df = 8, P<.001).

Fish aged 1.3 and 1.4 comprised 85% of the sample from Alaskan and transboundary escapements to wild runs (Appendix B.1). Only 0.4% of the Alaskan fish were age-0. and only 0.1% of the fish sampled were age-2.

Returns to Alaskan hatcheries were comprised of both age-0. and age-1. fish (Appendix B.1) as were runs to British Columbia, Washington, and Oregon (Appendix B.2). The runs to the Nass and Skeena Rivers were mostly of fish aged 1., while age-1. fish comprised about half of those sampled from the Bella Coola and Fraser Rivers. Fish aged 1. comprised 18% of the Washington inland samples, 2% of the Washington coastal samples, and 8% of the Oregon Coastal samples. The spring run of fish to the Columbia River is comprised almost entirely of age-1. fish. Fish aged 2., 1.4, and older spring run chinook were rare in the Washington-Oregon escapements. Age-.2 and age-.3 fish were the dominant ocean ages in the Washington-Oregon Region.

Scale Pattern Analysis

Large differences in scale growth patterns between regions relative to that within regions enabled accurate discrimination between groups (Tables 4 and 5; Figures 5, 6, and 7). The stepwise discriminant procedure revealed that scale characters corresponding to the freshwater growth were the most powerful in distinguishing Alaskan from non-Alaskan fish. Average classification accuracies and on-diagonal balance increased slightly after inclusion of three variables (Table 6; Figure 8). I used the models with the highest average classification accuracy. The proportion correctly classified in the SPA models was 0.811 and 0.886 for the age-1.2 and -1.3 Alaska versus British Columbia versus Washington-Oregon models, respectively, and 0.869 for the age-1.4 Alaska versus non-Alaska model (Table 7). Misclassifications were usually highest between Alaska and British Columbia and from Washington-Oregon to British Columbia.

Scales from Alaska fish averaged fewer circuli in the freshwater annular zone and fewer circuli in the first marine annular zone. For fish aged 1.2 and 1.3 the largest differences were in the total number of freshwater circuli (variable no. 65). Among fish aged 1.4, the number of circuli in the freshwater annular zone (variable no. 1) was the best discriminator. Variables corresponding to the first ocean annular zone were also of value in discriminating between the groups. Fewer freshwater circuli and smaller size of the freshwater growth zones probably reflects the slower growth of the Alaskan fish likely in response to a cooler, less productive environment. Scales from the Washington-Oregon Region had the greatest number of circuli in the freshwater annular zone and plus growth zone. A high proportion of the Columbia Rivers Corbett and Woody Islands test fishery samples and Stillaguamish River samples used to construct the Washington-Oregon standards were from hatchery fish (K. Myers, Fisheries Research Institute, University of Washington, Seattle, personnel communication). The uniqueness of these scale features largely reflects the differences in hatchery reared fish. Scales from British Columbia fish had the greatest number of circuli in the first marine annular zone.

There was not an appreciable drop in accuracy between the age-specific and age-pooled models (Table 8). The average of the age-specific models was

0.910 and for the age-1.2, -1.3, and -1.4 pooled models was 0.904, a negligible 0.006 drop in accuracy.

Most of the known origin Alaska hatchery age-1. fish were classified to the non-Alaska group (Table 9). This data was used to correct for "misclassification" of Alaskan hatchery fish into the Alaska wild or non-Alaska groups.

Coded Microwire Tag Analysis

Based on coded microwire tag data, Alaskan hatcheries contributed an estimated 24 fish to the winter troll fishery (8 March to 14 April 1983) (Appendix A.2), 935 fish to the summer troll fishery (Appendix A.3), 7 fish to the District 104 seine fishery, and 21 fish to the Districts 101 and 111 gill net fisheries (Appendix A.4). Most of the Alaskan hatchery fish were aged 1., 845 fish out of the total of 987. Most of the release groups had close to 100 percent of the fish tagged. A total of 47 different tag codes were recovered, representing releases from four Alaskan hatcheries - Deer Mountain, Crystal Lake, Little Port Walter, and Snettisham.

Spatially, of the 935 fish contributed by Alaskan hatcheries to the summer troll fishery, most were harvested in the Northern Inside Area [352 (38%)], followed by the Northern Outside area [271 (29%)], and the Southern Inside Area [239 (27%)] fish (Appendix A.3).

Stock Composition of Catch

Age-0. non-Alaskan chinook dominated the 1982 harvests (Table 10; Figure 9). Non-Alaskan wild and hatchery fish comprised 76.6% of the summer troll harvest, 80.9% of the 8 March to 14 April winter troll fishery, 95.0% of the District 104 seine harvest, and 32.9% of the District 101 and 111 gill net harvest (Table 10). The contribution of Alaskan hatchery fish was less than 0.4% (987 fish) to these fisheries.

Winter Troll

Limited samples required pooling across all areas for the SPA classification of age-1.2 fish. Similarly, the inside and outside areas were pooled for the age-1.4 fish (Appendix D.1 to D.3). During the 8 March to 14 April period, 6,488 chinooks were harvested of which 5,249 (80.9%) were of non-Alaskan origin, and 24 (0.4%) were of Alaskan hatchery origin (Table 11).

Differences were present in the regional contribution of fish aged 1. (Appendix D.4). Among fish aged 1.2 Washington-Oregon stocks predominated (45.4%), while Alaska (28.4%) and British Columbia (26.2%) stocks were about equally represented. Among fish aged 1.3, British Columbia fish (55.0%) were slightly more abundant than Alaskan stocks (41.5%) while Washington-Oregon stocks were scarce (3.5%). More fish aged 1.4 were Alaskan (58.3%) than of non-Alaskan origin.

Summer Troll

An estimated 175.1 thousand or 76.6% of the 228.4 thousand chinook salmon caught in the 1982 summer troll fishery originated from wild or hatchery runs in British Columbia, Washington, Oregon, and Idaho, 52.4 thousand (22.9%) originated from Alaskan wild runs, and 935 (0.4%) originated from Alaskan hatchery runs (Table 10; Figure 9). The summer troll fishery was composed of 55.4% age-0. non-Alaskan fish and approximately half of the remaining fish aged 1. and 2. were also of non-Alaskan origin.

Most of the harvest (78%) occurred in outside areas, with 60% in the Northern Outside Area alone. Fish of non-Alaskan origin dominated the harvest in all four areas; 83.3% in Northern Outside, 78.2% in Southern Outside, 57.0% in Northern Inside, and 56.2% in the Southern Inside area (Tables 12 to 15; Figures 10, 11, and 12).

The catch per boat day (CPUE) of both Alaskan and non-Alaskan chinook declined through the season in all areas (Figure 12). There was, however, a mid-July peak in CPUE of non-Alaskan fish in the Northern Outside and Inside Areas. The CPUE of Alaskan fish was highest in the inside areas and, for non-Alaskan fish, was highest in outside areas (Figure 13).

Alaskan hatchery fish accounted for a small percent of the harvest in all areas. The highest contribution was in the Northern Inside Area where 352 (1.4%) of the catch originated from Alaskan hatcheries (Table 14).

The harvest of age-1.2 fish was dominated by Washington-Oregon fish in the outside areas and by Alaskan wild fish in the inside areas (Figures 14 and 15; Appendix D.5 to D.8). In all areas Alaskan wild fish comprised the highest percent of the age-1.3 fish harvested and Washington-Oregon fish, the smallest proportion (Figures 16 and 17; Appendix D.5 to D.8). Most of the age-1.4 fish caught were Alaskan wild fish except in the Southern Outside area where 81.1% of the catch was of non-Alaskan origin (Figures 18 and 19; Appendix D.5 to D.8). The catch of age-1.4 fish declined sharply through the season in all areas.

The CPUE of Alaskan age-1.2 fish in the Northern Outside Area was highest in mid-June but was increasing again in late-July when the fishery closed (Figure 20). The low CPUE in late-May and early-June indicates that fish of this age class are not large enough to be fully recruited to the fishery. The CPUE for Alaskan age-1.2 fish showed a seasonal decrease in the Southern Outside Area and increase in the inside areas. The CPUE of Alaskan age-1.3 and 1.4 fish declined through the season in all areas with the exception of age-1.4 fish in the Northern Inside Area which showed a mid-June peak (Figures 21 and 22).

Seine and Gill Net

Non-Alaskan fish aged 0. and 1. comprised 82.4% and 12.6% of the District 104 seine fishery harvest, respectively, for a total contribution of 95.0% (Table 10; Figure 9). Alaska wild fish comprised only 5.5% of the age-1.2 fish and 8.5% of the age-1.4 fish harvested but 49.7% of the age-1.3 fish (Appendix D.9). Most (76.2%) of the age-1.2 fish were classified to the

Washington-Oregon group. Alaskan hatcheries contributed only 7 fish to this fishery.

The majority (66.8%) of the fish harvested in the District 101 and 111 gill net fisheries were of Alaskan wild origin (Table 10; Figure 9). Fish originating from the Alaskan wild group comprised 76.6% of the age-1.2,-1.3, and -1.4 fish harvested (Appendix D.9). Only 13% of the catch was comprised of non-Alaskan age-0. fish. The Washington-Oregon region contributed few age-1. fish: 4.8% of the age-1.2 catch, none of the age-1.3 catch, and probably none of the age-1.4 catch since there were few age-1.4 fish returning to the Washington-Oregon region (Appendix B.2). Alaskan hatcheries contributed a total of 21 fish to this fishery.

Scale Pattern Analysis of Alaskan Hatchery Fish

I evaluated the feasibility of using SPA in a linear discriminant function to estimate the harvest of Alaskan hatchery age-1. fish. The average classification accuracies for the age-1.2 and -1.3 Alaska hatchery versus Alaska wild versus British Columbia versus Washington and Oregon model was 0.752 and 0.799, respectively. The mean proportion correctly classified for the age-1.4 Alaska hatchery versus Alaska wild versus British Columbia, Washington, and Oregon model was 0.854 (Appendix C.1). The same mixed stock scales as used in our previous analysis were classified using the appropriate age specific SPA model (Appendix C.2 to C.14).

Scale pattern analysis classified too many fish to the Alaskan hatchery group, particularly in the Northern Outside Area (Table 16). The model accuracies while good demonstrate the problem of relative precision of SPA versus CWT for estimating mixing proportions for stocks which only minimally contribute (Table 17).

DISCUSSION

Differences in Scale Patterns

The differences in scale patterns between regions might be attributed mainly to differences in the freshwater rearing habitats. Differences in habitats reflect the broad geographical distributions of the runs. Fewer freshwater circuli and smaller size of the freshwater scale growth zones of Alaskan fish (Tables 4 and 5; Figures 5 to 7) probably reflects the slower growth resulting from a cooler and less productive environment in the more northerly latitudes. Since three brood years, 1976 to 1978, are represented in the age pooled models (Table 8), we would expect that annual variation in scale growth patterns would have reduced their accuracy relative to the age specific models. The stability in model accuracies indicates that there was little intragroup variation in scale patterns between these years. These differences in scale growth patterns are probably consistent between years because of the large geographical separation of the runs. The

stability in scale patterns over years indicates that a historical model can be used to accurately estimate stock compositions of current year catches.

Since the within region variability in scale patterns is small compared to that between regions, the SPA models may be relatively insensitive to how individual runs were combined to make each standard. This permits construction of models which will perform consistently without strong bias resulting in failure to weight accurately. Sensitivity tests (see Marshall et al. 1984) are warranted to further assess potential biases in model construction. Increased returns to Behm Canal and Boca de Quadra area rivers (i.e., Unuk, Chickamin, Wilson, Blossom, and Keta) since 1982 and the more inside residence of these runs compared to the transboundary river runs, indicate that these stocks need to be better represented in future studies.

The reasonably good separability of Alaskan hatchery fish indicates that SPA could be used to accurately estimate contributions of these fish when they comprise a significant portion of the catch. Further investigation is warranted into the separability of Alaskan wild runs. Particularly into the separability of the more offshore migrating transboundary river runs from the more inside resident King Salmon River, Andrew Creek, Beam Canal, and Boca de Quadra runs.

Although the age-0. fish were classified into one "non-Alaska" group there is a potential that SPA, CWT, or genetic data might be useful in estimating the British Columbia versus Washington-Oregon origins of these fish. The separability of major British Columbia, Washington, and Oregon stocks of age-0. fish using SPA was met with limited success in a feasibility study, however (Myers and Rogers, 1985). Coded microwire tag data is suitable for estimating the minimum contribution of British Columbia hatchery origin chinook (Clark et al. 1985) since all production releases were represented by a tag code (Don Bailey, Canadian Department of Fisheries and Oceans, Vancouver, personnel communication). Non-Alaskan hatchery released are predominately of age-0. fish (Johnson 1985).

Distribution of Alaskan Stocks

I found that Alaskan/transboundary stocks rear both in and out of the Southeast Alaska Archipelago. I conclude that some Alaskan wild and hatchery fish must reside in Southeast Alaska waters their whole life since significant numbers of Alaskan age-1.2, -1.3, and -1.4 fish are caught throughout the summer, from mid-May to late September. If all age-1.2 and older spring run Alaska fish reared outside the region and were only susceptible to capture when they pass through inside waters as maturing fish enroute to their natal streams, then we would not expect Alaskan fish in the catches after mid-July when most maturing fish have entered their respective rivers. This conclusion is further supported by recoveries of juvenile Alaskan age-1.0, -1.1, and -1.2 tagged (CWT) chinook in all sampled areas and times (Orsi et al. 1987) and other recoveries of tagged Alaskan fish (Kissner 1984 and 1985, Clark et al. 1985, and Clark and Marshall 1986, ADF&G 1987). Also, between Alaskan age-1.3 and -1.4 fish,

there is a higher proportion of age-1.3 fish in the troll catches (75.5%) than in the escapements (30.0%) (Table 18). This indicates that some of these age-1.3 fish are not maturing and are continuing to rear in Southeast Alaska waters since there is no reason to assume that the catchability of age-1.3 fish is higher than for age-1.4 fish. The same trend occurs between age-1.2 and -1.3 fish with the relative proportion of age-1.2 fish higher in catches than escapements. However this difference is not as great since some age-1.2 fish are shorter than the 28 inch (total length) retention size limit. Ocean age-.2 fish are also possibly under represented in escapement samples due to their smaller size.

The seasonal decline in CPUE of Alaskan chinook (Figure 13 and 20 to 22) is consistent with the hypothesis that some Alaskan/transboundary chinook reside outside of Southeast Alaska waters for at least part of their life and are, therefore, available for harvest only during their spring spawning migration. Support for this hypothesis is also found in recovery of CWT fish. First, there have been 34 recoveries of tagged (CWT) Southeast Alaska hatchery and one wild (Stikine River) chinook salmon documented in catches by the Japanese salmon mothership fleet, Japanese research vessels, and foreign groundfish vessels operating in the North Pacific Ocean (Wertheimer and Dahlberg 1984, Dahlberg and Fowler 1985, Dahlberg et al. 1986, Dahlberg et al. 1987 and summarized in Appendix A.5). The high seas recoveries of nine age-1.1 fish indicate that at least some fish migrated offshore during their first ocean year. Second, there have been few recoveries in the region of coded microwire tagged Taku and Stikine River fish at times outside of the April to mid-July spawning migration period (Kissner 1984 and 1985). The few recoveries have been of young fish aged 1.1 and 1.2. The majority of these fish must, therefore, rear outside the region and are only available during their spawning migration. However, Kissner (1985) also pointed out an apparent difference in migration pattern between upriver Taku and Stikine River stocks and Crystal Lake hatchery releases of the coastal Andrew Creek stock. He noted that while the Taku and Stikine fish reared offshore the Crystal Lake fish were being intercepted year around in inside fisheries.

Healey (1983) concluded from a review of published age composition data from inside and outside fisheries in Washington, British Columbia, and Alaska, that age-1. fish tend to move offshore in July and August during their first ocean year and are most abundant along the open coast outside the surf line. Healey contrasted this offshore movement of age-1. fish with the more inside residence of age-0. fish. The presence of age-1. British Columbia and Washington-Oregon fish in Southeast Alaska waters is in contradiction to Healey's (1983) and Orsi's (1987) statements that these fish rear offshore.

Hartt (1980) theorized from examination of high seas recoveries of CWT'ed chinook that the age-1. spring chinook stocks in the Columbia River have a broader ocean migration than the age-0. fall chinook stocks. These age-1. fish primarily spawn above the Dalles Dam and are considered upriver spawners. Utter et al. (1987) found that for the major fall chinook stocks (predominately age-0. fish), upriver brights and lower river tules, that the upriver brights have much broader offshore ocean distribution. This data indicates that for the Columbia River stocks the more inland a stock spawns the further offshore is its ocean distribution. Fraidenburg et al.

(1985) pointed out that stocks originating from inside areas such as the Puget Sound and Georgia Strait tend to have a nearshore resident population component, while the Washington coastal stocks do not.

I believe a similar migrational pattern is true for more northern interior versus coastal spawning populations; a significant number of the upriver transboundary Alsek, Taku, and Stikine stocks rear offshore, while a large proportion of the fish from the shorter, inside rivers rear for all or a majority of their life in inside or near-shore waters. The much higher CPUE of Alaskan hatchery fish in inside waters (Figure 23) reflects the resident nature of these fish whose brood stocks are from inside coastal populations (i.e., Andrew Creek, King Salmon River, Unuk River and Chickamin River).

Management Implications

The Alaska chinook salmon that rear in Southeast Alaska waters for most or all of their marine life are subjected to harvest in commercial and sport fisheries for one or more years. Unlike management of coho, sockeye, chum and pink salmon which centers on regulating interceptions of maturing fish on their spawning migration, management of Alaskan chinook needs to consider direct and induced harvest mortality of immature fish as well.

Despite the mixed stock harvest in Southeast Alaska fisheries, observed differences in stock composition between gear type, area, and time may be useful in designing regulations to selectively harvest of protect certain stock groups. However, significant differences in relative abundance and conflict among users may limit the ability to control harvest among stocks.

For instance, if the troll fishing effort was shifted from outside to inside waters, then the harvest of Alaskan fish would increase, and the harvest of non-Alaskan fish decrease since the CPUE for Alaskan fish is higher in inside than outside waters and the CPUE for non-Alaskan fish in lower in inside versus outside waters (Figure 13). However, such a scenario would invoke a major change in the fleet distribution since the majority of the fishing effort and catches have occurred in the Northern Outside Area in recent years. Such a movement would also probably lower the overall catch rates since, presumably, the fleet is currently maximizing its catch rate. In addition, there would be increased gear conflicts and allocation disputes with existing recreational and net fisheries in inside areas.

The current opening of the summer troll fishery in late-June or later, combined with specific area closures in inside waters is probably most effective at protecting maturing wild Alaskan fish on their spawning migration. This is best evidenced by the rapid decline in CPUE of maturing Alaskan age-1.4 fish through June (Figure 22). Ages 1.2 and 1.3 show similar trends reflective of emigration of the maturing population component out of the fishery Figures 20 and 21). This management strategy is probably of more direct benefit to the Alaskan fish that reared outside of Southeast Alaska, although it certainly benefits maturing Alaskan fish that have reared in local waters throughout their marine life. Since females primarily spawn at age-1.4 and males at age-1.2 and -1.3, limiting harvests on maturing fish particularly protects females.

CONCLUSIONS AND RECOMMENDATIONS

(1) The contribution of Alaska wild, Alaska hatchery, and non-Alaska (British Columbia, Washington, Oregon) chinook salmon to Southeast Alaska commercial fisheries in 1982 can be estimated using a combination of age composition, scale pattern and coded microwire tag data.

(2) Approximately half of the 1982 chinook harvest was non-Alaskan age-0. fish, one-quarter was non-Alaskan age-1. fish, and one-quarter was Alaska and Alaska-British Columbia transboundary river age-1. fish. Approximately 1,000 Alaskan hatchery origin chinooks were harvested in 1982.

(3) Alaska, British Columbia, and Washington-Oregon spring chinook salmon can be accurately discriminated using analysis of scale patterns in a linear discriminant function.

(4) Alaskan chinook salmon rear both in and out of the Southeast Alaska Archipelago.

(5) The CPUE of Alaskan chinook salmon in 1982 was higher in inside than outside waters and declined through the season in all areas.

(6) Scale patterns of Alaskan hatchery chinook salmon were measurably different from those for Alaskan wild and non-Alaskan fish. However, model accuracies were not high enough to accurately estimate hatchery contributions since this group comprised such a small proportion of the catch.

(7) Additional research is warranted into:

   (a) identification of the regional origins, British Columbia versus Washington-Oregon, of the fall chinook using SPA, CWT, and/or genetic data; and

   (b) feasibility of using SPA to separate Alaska non-transboundary (coastal) runs from transboundary (inland) runs.

LITERATURE CITED

ADF&G (Alaska Department of Fish and Game). 1987. Preliminary review of 1986 chinook salmon hatchery addon for Southeast Alaska fisheries and projected addon for 1987. Report to the Pacific Salmon Commission, May 18, 1987, Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.

Bilton H. 1970. Data and computations used in racial analysis of age 1.2 and 1.3 North American sockeye on the basis of their scale characters. Fisheries Research Board Canada Technical Report 223.

Chinook Technical Committee. 1987. 1986 summary report. Pacific Salmon Commission, Chinook Technical Committee, TCCHINOK (87)4, February 28, 1987, Vancouver, British Columbia.

Clark, J.E., B.W. Van Alen, and R.P. Marshall. 1985. Estimated contribution of coded wire tagged releases of chinook salmon (*Oncorhynchus tshawytscha*) to the commercial fisheries of Southeast Alaska in 1982. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Data Report 161, Juneau.

Clutter, R.I. and L.E. Whitesel. 1956. Collection and interpretation of sockeye salmon scales. International Pacific Salmon Fisheries Commission Bulletin 9, Vancouver, British Columbia.

Cook R. and G. Lord. 1978. Identification of stocks of Bristol Bay sockeye salmon by evaluating scale patterns with a polynomial discriminant method. Fishery Bulletin 76(2):415-423.

Dahlberg, M.L. 1981. Report of the incidence of coded-wire tagged salmonids in catches of foreign commercial and research vessels operating in the North Pacific Ocean during June and July 1980-1981. Document submitted to annual meeting of the International North Pacific Fisheries Commission, Vancouver, British Columbia, November 1981.

Dahlberg, M.L. 1982. Report of the incidence of coded-wire tagged salmonids in catches of foreign commercial and research vessels operating in the North Pacific Ocean during June and July 1980-1982. Document submitted to annual meeting of the International North Pacific Fisheries Commission, Tokyo, Japan, November 1982.

Dahlberg M.L. and S. Fowler. 1985. Report on the incidence of coded-wire tagged salmonids in catches of foreign commercial and research vessels operating in the North Pacific Ocean and Bering Sea during 1984-1985. Document submitted to annual meeting of the International North Pacific Fisheries Commission, Tokyo, Japan, November 1985.

LITERATURE CITED (Continued)

Dahlberg M.L., F.P. Thrower, and S. Fowler. 1986. Incidence of coded-wire-tagged salmonids in catches of foreign commercial and research vessels operating in the North Pacific Ocean and Bering Sea in 1985-1986. Document submitted to annual meeting of the International North Pacific Fisheries Commission, Anchorage, Alaska, November 1986.

Dahlberg M.L., F.P. Thrower, and S. Fowler. 1987. Report on the incidence of coded-wire-tagged salmonids in catches of foreign commercial and research vessels operating in the North Pacific Ocean and Bering Sea in 1986-1987. Document submitted to annual meeting of the International North Pacific Fisheries Commission, Vancouver, British Columbia, November 1987.

Davis R.A., D. Wood, and P. Hunn. 1979. A coded wire tag recovery program on chinook and coho salmon in Southeast Alaska 1978. Contract No. 78-7, North Pacific Fisheries Management Council. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.

Enslein, K., A. Ralston, and H.S. Wilf. 1977. Statistical Methods for Digital Computers. John Wiley and Sons, Inc., New York.

Fisher, R.A. 1936. The use of multiple measurements in taxonomic problems. Annual Eugenics 7:179-188.

Fraidenburg, M.E., M.A. Hunter, J.M. Stohr, and P.L. Pattillo. 1985. The ocean journeys of Pacific Northwest chinooks, cohos, and steelheads. Pages 109-126 *in* Stroud, R.H., editor. Proceedings of the tenth annual marine recreational fisheries symposium: Marine recreational fisheries, recreational uses, production and management of anadromous pacific salmonids. International Game Fish Association, the National Coalition for Marine Conservation, Inc., Savannah, Georgia.

Funk, F. 1981. Analysis of Southeastern Alaska troll fisheries data. Final Report, Contract 79-4, North Pacific Fishery Management Council. Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.

Goodman, L. 1960. On the exact variance of products. Journal of the American Statistical Association 55:708-713.

Hartt, A.C. 1980. Juvenile salmonids in the ocean ecosystem - the first critical summer. Pages 25-57 *in* W.J. McNeil and D.C. Himsworth, editors. Salmonid Ecosystems of the North Pacific. Oregon State University Press, Corvallis.

Healy, M.C. 1983. Coastwide distribution and ocean migration patterns of stream- and ocean-type chinook salmon, *Oncorhynchus tshawytscha*. Canadian Field-Naturalist, 97(4):427-433.

LITERATURE CITED (Continued)

INPFC (International North Pacific Fisheries Commission). 1963. Annual Report 1961, Vancouver, British Columbia.

Johnson, J.K. 1985. Pacific salmonid coded wire tag releases through 1984. Pacific Marine Fisheries Commission, Regional Mark Processing Center, Portland, Oregon.

Kissner, P.D., Jr. 1973. A study of chinook salmon in Southeast Alaska. Alaska Department of Fish and Game, Division of Sport Fish, Annual Report 1972-1973, Project AFS-41-1, 1(AFS-41), Juneau.

Kissner, P.D., Jr. 1974. A study of chinook salmon in Southeast Alaska. Alaska Department of Fish and Game, Division of Sport Fish, Annual Report 1973-1974, Project AFS-41, 2(AFS-41), Juneau.

Kissner, P.D., Jr. 1975. A study of chinook salmon in Southeast Alaska. Alaska Department of Fish and Game, Division of Sport Fish, Annual Report 1974-1975, Project F-9-7, 3(AFS-41), Juneau.

Kissner, P.D., Jr. 1976. A study of chinook salmon in Southeast Alaska. Alaska Department of Fish and Game, Division of Sport Fish, Annual Report 1975-1976, Project F-9-8, 17(AFS-41), Juneau.

Kissner, P.D., Jr. 1977. A study of chinook salmon in Southeast Alaska. Alaska Department of Fish and Game, Division of Sport Fish, Annual Report 1976-1977, Project F-9-9, 18(AFS-41), Juneau.

Kissner, P.D., Jr. 1978. A study of chinook salmon in Southeast Alaska. Alaska Department of Fish and Game, Division of Sport Fish, Annual Report 1973-1974, Project F-9-10, 19(AFS-41), Juneau.

Kissner, P.D., Jr. 1984. A study of chinook salmon in Southeast Alaska. Alaska Department of Fish and Game, Division of Sport Fish, Annual Report 1983-1984, Project F-9-16, 25(AFS-41), Juneau.

Kissner, P.D., Jr. 1985. A study of chinook salmon in Southeast Alaska. Alaska Department of Fish and Game, Division of Sport Fish, Annual Report 1984-1985, Project F-9-17, 26(AFS-41), Juneau.

Lachenbruch, P. 1967. An almost unbiased method of obtaining confidence intervals for the probability of misclassification in discriminant analysis. Biometrics 23(4):639-645.

Marshall, S.L., G.T. Oliver, D.R. Bernard, and S.A. McPherson. 1984. Accuracy of scale pattern analysis in separating major stocks of sockeye salmon (*Oncorhynchus nerka*) from southern Southeastern Alaska and northern British Columbia. Alaska Department of Fish and Game, Division of Commercial Fisheries, Informational Leaflet 230, Juneau.

LITERATURE CITED (Continued)

Marshall, R.P. and J.E. Clark. 1986. Estimated contribution of coded wire tagged releases of chinook salmon (*Oncorhynchus tshawytscha*) to the commercial fisheries of Southeastern Alaska in 1983. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Data Report 167, Juneau.

McBride, D.N. and J.A. Wilcock. 1983. Alaska chinook salmon (*Oncorhynchus tshawytscha*) catch and escapement, 1961-1980, with age, size, and sex composition estimates. Alaska Department of Fish and Game, Division of Commercial Fisheries, Informational Leaflet 212, Juneau.

McGregor, A.J. and B.W. Van Alen. 1987. Abundance, age, and sex composition of chinook, sockeye, coho, and chum salmon catches and escapements in Southeast Alaska in 1981. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Data Report 200, Juneau.

Myers, K.W. and D.E. Rogers. 1983. Determination of stock origins of chinook salmon incidentally caught in foreign trawls in the Alaska FCZ. Final Report, Contract 81-5, North Pacific Fisheries Management Council. University of Washington, Fisheries Research Institute, FRI-UW-8318, Seattle.

Myers, K.W. and D.E. Rogers. 1985. Determination of stock origins of chinook salmon incidentally caught in foreign trawls in the Alaska FCZ: Part II. Final Report, Contract 84-3, North Pacific Fisheries Management Council. University of Washington, Fisheries Research Institute, FRI-UW-8502, Seattle.

Orsi, J.A., A.G. Celewycz, D.A. Mortensen, and K.A. Herndon. 1987. Sampling juvenile chinook salmon (*Oncorhynchus tshawytscha*) and coho salmon (*O. kisutch*) by small trolling gear in the northern and central regions of Southeastern Alaska, 1985. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Technical Memorandum NMFS F/NWC-115.

Parker, R.R. and W. Kirkness. 1956. King salmon and the ocean troll fishery of Southeastern Alaska. Alaska Department of Fisheries, Research Report 1, Juneau.

Pella, J.J. and T.L. Robertson. 1979. Assessment of composition of stock mixtures. Fishery Bulletin 77:387-389.

Ryan, P. and M. Christie. 1976. Scale reading equipment. Fisheries and Marine Service, Canada. Technical Report PAC/T-75-8, Nanaimo, British Columbia.

LITERATURE CITED (Continued)

Utter, F., D. Teel, G. Milner, and D. McIsaac. 1987. Genetic estimates of stock compositions of 1983 chinook salmon, *Oncorhynchus tshawytscha*, harvests off the Washington Coast and the Columbia River. Fishery Bulletin 85:13-23.

Van Alen, B.W. and M.A. Olsen. 1986. Abundance, age, sex, and size composition of chinook salmon (*Oncorhynchus tshawytscha*) catches and escapements in Southeastern Alaska, 1984. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Data Report 190, Juneau.

Van Alen, B.W. and D.S. Wood. 1983. Abundance, age, size, and sex composition of chinook salmon (*Oncorhynchus tshawytscha*) catches and escapements in Southeastern Alaska, 1982. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Data Report 102, Juneau.

Van Alen, B.W., K.A. Pahlke, and M.A. Olsen. 1987. Abundance, age, sex, and size of chinook salmon (*Oncorhynchus tshawytscha*) catches and escapements in Southeastern Alaska in 1985. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Data Report 215, Juneau.

Van Alen, B.W., D.S. Wood, and S.L. Marshall. 1986. Abundance, age, sex, and size of chinook salmon (*Oncorhynchus tshawytscha*) catches and escapements in Southeastern Alaska, 1983. Alaska Department of Fish and Game, Division of Commercial Fisheries, Technical Data Report 177, Juneau.

Wertheimer, A.C. and M.L. Dahlberg. 1983. Report on the incidence of coded-wire tagged salmonids in catches of foreign commercial and research vessels operating in the North Pacific Ocean and Bering Sea during 1982-1983. Document submitted to annual meeting of the International North Pacific Fisheries Commission, Anchorage, Alaska, November 1983.

Wertheimer, A.C. and M.L. Dahlberg. 1984. Report on the incidence of coded-wire tagged salmonids in catches of foreign commercial and research vessels operating in the North Pacific Ocean and Bering Sea during 1983-1984. (Document submitted to annual meeting of the International North Pacific Fisheries Commission, Vancouver, B.C., November 1984.

TABLES AND FIGURES

Table 1. Scale pattern variables used to build linear discriminant functions (continued).

Variable Number	Description
	Freshwater (FW) Annular Zone
1	Number of circuli in the zone
2	Distance across the zone
3	Distance: scale focus (CO) to the second circulus in zone (C2)
4	Distance: CO to C4
5	Distance: CO to C6
6	Distance: CO to C8
7	Distance: C2 to C4
8	Distance: C2 to C6
9	Distance: C2 to C8
10	Distance: C4 to C6
11	Distance: C4 to C8
12	Distance: fourth from the last circulus of zone to end of zone
13	Distance: second from the last circulus of zone to end of zone
14	Distance: C2 to end of zone
15	Distance: C4 to end of zone
16	Relative Distance: (Variable #3)/(Variable #2)
17	Relative Distance: (Variable #4)/(Variable #2)
18	Relative Distance: (Variable #5)/(Variable #2)
19	Relative Distance: (Variable #6)/(Variable #2)
20	Relative Distance: (Variable #7)/(Variable #2)
21	Relative Distance: (Variable #8)/(Variable #2)
22	Relative Distance: (Variable #9)/(Variable #2)
23	Relative Distance: (Variable #10)/(Variable #2)
24	Relative Distance: (Variable #11)/(Variable #2)
25	Relative Distance: (Variable #12)/(Variable #2)
26	Relative Distance: (Variable #13)/(Variable #2)
27	Average Distance between circuli: (Variable #2)/(Variable #1)
28	Number of circuli in the first 3/4 of the zone
29	Maximum distance between two adjacent circuli in the zone
30	Relative Distance: (Variable #29)/(Variable #2)
	Freshwater Plus Growth (PG) Zone
61	Number of circuli in the zone
62	Distance across the zone
	Combined Freshwater Zones
65	Total number of circuli in the combined zones
66	Total distance across the combined zones
67	Relative Distance: (Variable #2)/(Variable #66)
68	Relative Distance: (Variable #62)/(Variable #66)

-Continued-

Table 1. (page 2 of 2)

Variable Number	Description
	First Marine Annular Zone
70	Number of circuli in the zone
71	Distance across the zone
72	Distance: end of FW (EFW) to the third circulus in zone (C3)
73	Distance: EFW to C6
74	Distance: EFW to C9
75	Distance: EFW to C12
76	Distance: EFW to C15
77	Distance: C3 to C6
78	Distance: C3 to C9
79	Distance: C3 to C12
80	Distance: C3 to C15
81	Distance: C6 to C9
82	Distance: C6 to C12
83	Distance: C6 to C15
84	Distance: C9 to C15
85	Distance: sixth from the last circulus of zone to end of zone
86	Distance: third from the last circulus of zone to end of zone
87	Distance: C3 to end of zone
88	Distance: C9 to end of zone
89	Distance: C15 to end of zone
90	Relative Distance: (Variable #72)/(Variable #71)
91	Relative Distance: (Variable #73)/(Variable #71)
92	Relative Distance: (Variable #74)/(Variable #71)
93	Relative Distance: (Variable #75)/(Variable #71)
94	Relative Distance: (Variable #76)/(Variable #71)
95	Relative Distance: (Variable #77)/(Variable #71)
96	Relative Distance: (Variable #78)/(Variable #71)
97	Relative Distance: (Variable #79)/(Variable #71)
98	Relative Distance: (Variable #80)/(Variable #71)
99	Relative Distance: (Variable #81)/(Variable #71)
100	Relative Distance: (Variable #82)/(Variable #71)
101	Relative Distance: (Variable #83)/(Variable #71)
102	Relative Distance: (Variable #84)/(Variable #71)
103	Relative Distance: (Variable #85)/(Variable #71)
104	Relative Distance: (Variable #86)/(Variable #71)
105	Average distance between circuli: (Variable #71)/(Variable #70)
106	Number of circuli in the first 1/2 of the zone
107	Maximum distance between two adjacent circuli in the zone
108	Relative Distance: (Variable #107)/(Variable #71)

Table 2. Estimated escapements and age proportions used to subsample scales from chinook salmon of known origin from Alaskan runs for scale pattern analysis of fish aged 1.2, 1.3, and 1.4, 1982.

River/ Tributary	Index Escapement	Aerial Expansion	Tributary Expansion	Estimated Total Escapement[a]	Age-1.2 Proportion	Age-1.2 Desired Subsample	Age-1.2 Number Read	Age-1.3 Proportion	Age-1.3 Desired Subsample	Age-1.3 Number Read	Age-1.4 Proportion	Age-1.4 Desired Subsample	Age-1.4 Number Read
Alsek													
Klukshu	2,369	1.00[b]	1.56	3,702	0.17	53	17	0.42	45	43	0.40	13	11
Taku													
Nakina	2,533	1.33	1.67	5,629	0.16	76	76	0.21	34	34	0.41	20	20
Nahlin	1,246	1.33	1.67	2,769	0.02	5	3	0.14	11	11	0.82	20	20
Stikine													
Little Tahltan	2,830	1.60	2.36	10,679	0.03	27	10	0.17	53	53	0.78	75	75
Tahltan	1,690	1.60	2.36	6,380	0.02	11	3	0.14	26	20	0.75	42	42
Andrews	1,053	1.00[b]	1.00	1,053	0.06	5	5	0.13	4	4	0.75	7	7
Chilkat													
Chilkat Inlet[c]	-	-	-	1,000[d]	0.04	3	3	0.10	3	3	0.73	6	6
Keta													
Keta	754	1.60	1.00	1,206	0.04	4	1	0.35	11	3	0.57	6	1
Unuk													
Unuk	538	1.60	1.00	2,162	0.09	16	3	0.22	13	4	0.56	11	9
Total				34,580		200	121		200	175		200	191

[a] From Van Alen and Wood (1983).
[b] Weir Counts
[c] Samples collected from fish caught in Upper Chilkat Inlet during the Haines Salmon Derby (May 29-31, June 5-6, 1982).
[d] Escapement set at the average of the medium producers (Van Alen and Wood, 1983).

Table 3. Estimated inshore returns and age proportions used to subsample scales from chinook salmon of known origin from British Columbia, Washington, and Oregon runs for scale pattern analysis of fish aged 1.2, 1.3, and 1.4, 1982.

Region/ Stock	Inshore Return[a] (Catch + Escapement)	Age-1.2 Proportion	Age-1.2 Desired Subsample[b]		Age-1.2 Number Read		Age-1.3 Proportion	Age-1.3 Desired Subsample		Age-1.3 Number Read		Age-1.4 Proportion	Age-1.4 Desired Subsample	Age-1.4 Number Read
British Columbia														
Nass	18,878	0.26	27	(6)	23	(6)	0.60	34	(14)	34	(14)	0.14	17	15
Skeena	42,627	0.18	43	(10)	34	(10)	0.44	56	(24)	56	(24)	0.30	83	46
Bella Coola	14,850	0.15	12	(3)	12	(3)	0.22	10	(4)	10	(4)	0.16	15	15
Fraser	124,692	0.17	118	(28)	118	(28)	0.27	100	(43)	65	(43)	0.02	16	14
			200		187			200		165				
Washington-Oregon														
Washington Inland	454,971	0.12	93	(71)	29	(29)	0.06	60	(35)	29	(29)	0.00	0	
Washington Coastal	65,046	0.01	1	(1)	0	(0)	0.01	1	(1)	0	(0)	0.00	0	
Columbia R. (Spring)	136,300	0.43	100	(76)	100	(76)	0.45	135	(78)	135	(78)	0.01	9	3
Columbia R. (Fall)	291,600	-	-	-	-	-	-	-	-	-	-	-	-	-
Oregon Coastal	184,773	0.02	6	(5)	4	(4)	0.01	4	(2)	3	(3)	0.05	60	21
			200	(200)	133	(156)		200	(200)	200	(200)		200	114

[a] From Meyers and Rogers (1983)

[b] Numbers in parenthesis are the number of samples desired/read when British Columbia, Washington, and Oregon are combined in one group.

Table 4. Means and standard errors for scale variables used to construct linear discriminant functions for the age-1.2 and -1.3 Alaska wild, British Columbia and Washington-Oregon models and the age-1.4 Alaska wild and British Columbia-Washington-Oregon models, 1982.

Three-way model - Age-1.2

	Alaska		British Columbia		Washington-Oregon		F-to-Enter Statistic
Variable[a]	Mean	SE	Mean	SE	Mean	SE	(df=2,439)
65	13.89	0.14	16.13	0.21	22.38	0.40	242.80
85	91.93	1.02	76.09	0.76	87.04	1.17	75.95
106	13.46	0.15	14.40	0.14	14.50	0.22	10.28
11	34.13	0.56	31.24	0.41	37.61	0.60	39.03
62	36.12	1.36	34.16	1.09	58.16	2.32	67.84
25	0.26	0.00	0.23	0.01	0.19	0.01	9.15
80	209.78	1.98	196.83	1.53	207.73	1.93	16.60
70	28.55	0.26	31.41	0.27	31.02	0.37	24.37
Sample Size	121		187		134		

Three-way model - Age-1.3

	Alaska		British Columbia		Washington-Oregon		F-to-Enter Statistic
Variable	Mean	SE	Mean	SE	Mean	SE	(df=2,504)
65	13.70	0.16	14.95	0.14	23.06	0.26	672.92
70	26.67	0.27	31.71	0.25	28.84	0.28	92.34
89	182.61	4.46	233.41	4.29	206.24	4.73	32.06
18	0.77	0.01	0.68	0.01	0.48	0.01	473.47
66	158.19	2.31	150.12	1.69	239.66	3.43	366.58
94	0.59	0.01	0.51	0.01	0.56	0.01	39.47
25	0.27	0.00	0.22	0.00	0.19	0.01	85.65
Sample Size	175		165		167		

Two-way model - Age-1.4

	Alaska		British Columbia-Washington-Oregon		F-to-Enter Statistic (df=1,311)
Variable	Mean	SE	Mean	SE	
1	9.39	0.11	12.68	0.33	120.24
70	25.05	0.21	28.47	0.31	89.47
71	398.52	3.78	411.54	5.40	4.14
61	3.83	0.10	3.45	0.13	5.77
62	41.48	1.11	32.39	1.23	28.40
Sample Size	191		122		

[a] Variables are ranked in the order selected.

Table 5. Means and standard errors for the number of circuli in three scale zones (1 the freshwater annular zone or variable #1; 2 the freshwater plus growth zone or variable # 61; and 3 the first marine annular zone or variable #70) for age-1.2, -1.3, and -1.4 chinook salmon scales used to construct linear discriminant functions for the Alaska wild, British Columbia, and Washington-Oregon scale pattern models, 1982.

Age-1.2

	Means and (SE) by Region			F-Stat	
Scale Zone	Alaska	British Columbia	Washington-Oregon	(DF=2,439)	Probability
1	10.43 (0.14)	12.19 (0.17)	16.47 (0.35)	157.30	<.001
2	3.46 (0.12)	3.94 (0.12)	5.91 (0.21)	66.16	<.001
3	28.55 (0.26)	31.41 (0.27)	31.02 (0.37)	24.37	<.001
Sample Size	121	187	134		

Age-1.3

				F-Stat	
Scale Zone	Alaska	British Columbia	Washington-Oregon	(DF=2,504)	Probability
1	9.74 (0.13)	11.71 (0.14)	17.34 (0.25)	473.14	<.001
2	3.96 (0.14)	3.24 (0.10)	5.75 (0.17)	85.66	<.001
3	26.67 (0.27)	31.71 (0.25)	28.84 (0.28)	92.34	<.001
Sample Size	175	165	167		

Age-1.4

			F-Stat	
Scale Zone	Alaska	British Columbia-Washington-Oregon	(DF=2,311)	Probability
1	9.39 (0.11)	12.68 (0.33)	120.24	<.001
2	3.83 (0.10)	3.45 (0.13)	5.77	<.005
3	25.05 (0.21)	28.47 (0.31)	89.47	<.001
Sample Size	191	122		

Table 6. Classification accuracies at each step of variable inclusion in the linear discriminant function models for classification of Alaska, British Columbia, and Washington-Oregon age-1.2, -1.3, and -1.4 chinook salmon, 1982. An asterisk denotes the step/model with the highest average accuracy and the one used for classification of mixed stock samples.

Age-1.2 Model:

	Variable		On-Diagonal Accuracy			
Step	Added	Removed	Alaska	British Columbia	Washington-Oregon	Average Accuracy
1	65		0.847	0.495	0.701	0.681
2	85		0.831	0.701	0.724	0.752
3	106		0.864	0.712	0.694	0.757
4	11		0.831	0.745	0.724	0.767
5	62		0.873	0.777	0.724	0.791
6	25		0.873	0.745	0.761	0.793
7	80		0.873	0.772	0.761	0.802
8 *	70		0.881	0.783	0.769	0.811
9		106	0.873	0.772	0.754	0.800
	Sample Size =		118	184	134	

Age-1.3 Model:

	Variable		On-Diagonal Accuracy			
Step	Added	Removed	Alaska	British Columbia	Washington-Oregon	Average Accuracy
1	65		0.737	0.588	0.867	0.731
2	70		0.817	0.788	0.880	0.828
3	89		0.829	0.855	0.892	0.859
4	18		0.880	0.842	0.898	0.873
5	66		0.869	0.861	0.898	0.876
6	94		0.869	0.861	0.910	0.880
7 *	25		0.874	0.867	0.916	0.886
8	1		0.869	0.848	0.916	0.878
9	28		0.863	0.861	0.910	0.878
10	73		0.869	0.879	0.904	0.884
11	62		0.851	0.873	0.904	0.876
	Sample Size =		175	165	166	

Age-1.4 Model:

	Variable		On-Diagonal Accuracy		
Step	Added	Removed	Alaska	British Columbia-Washington-Oregon	Average Accuracy
1	1		0.932	0.549	0.741
2	70		0.885	0.787	0.836
3	71		0.869	0.844	0.857
4	61		0.864	0.820	0.842
5 *	62		0.885	0.852	0.869
	Sample Size =		191	122	

Table 7. Test classification matrices for linear discriminant function analysis of Alaska wild versus non-Alaska age-1.2, -1.3, and -1.4 chinook salmon, 1982.

Age-1.2 Alaska/British Columbia/Washington-Oregon

Actual Group of Origin	Sample Size	Classified Group of Origin (Variables = 65,85,106,11,62,25,80,70) Alaska	British Columbia	Washington-Oregon
Alaska	118	**0.881**	0.110	0.008
British Columbia	184	0.141	**0.783**	0.076
Washington-Oregon	134	0.060	0.172	**0.769**
		Average classification accuracy = 0.811		

Age-1.3 Alaska/British Columbia/Washington-Oregon

Actual Group of Origin	Sample Size	Classified Group of Origin (Variables = 65,70,89,18,66,94,25) Alaska	British Columbia	Washington-Oregon
Alaska	175	**0.874**	0.103	0.023
British Columbia	165	0.115	**0.867**	0.018
Washington-Oregon	166	0.024	0.060	**0.916**
		Average classification accuracy = 0.886		

Age-1.3 Alaska/British Columbia-Washington-Oregon

Actual Group of Origin	Sample Size	Classified Group of Origin (Variables = 18,70,89,30,65,66,25) Alaska	Non-Alaska
Alaska	175	**0.937**	0.063
Non-Alaska	193	0.078	**0.922**
		Average classification accuracy = 0.930	

Age-1.4 Alaska/British Columbia-Washington-Oregon

Actual Group of Origin	Sample Size	Classified Group of Origin (Variables = 1,70,71,61,62) Alaska	Non-Alaska
Alaska	191	**0.885**	0.115
Non-Alaska	122	0.148	**0.852**
		Average classification accuracy = 0.869	

Table 8. Comparison of the linear discriminant function test classification accuracies and 90% confidence intervals between age specific and age pooled models for analysis of the interannual variability in scale patterns, 1982.

Age Groups in Analysis	Classification Accuracy		Average Classification Accuracy	90% CI Interval
	Alaska	Non-Alaska		
1.2	0.923	0.713	0.810	0.149
1.3	0.942	0.828	0.881	0.117
1.4	0.865	0.844	0.854	0.128
1.2, 1.3	0.933	0.730	0.823	0.142
1.3, 1.4	0.904	0.803	0.850	0.129
1.2, 1.3, 1.4	0.904	0.770	0.832	0.137
Sample Size Per Analysis	104	122		

Table 9. Estimated stock classification of Alaska hatchery age-1. chinook salmon, 1982.

Fishery	Stock Classification	Age-1.2 Proportion	Age-1.2 Number	Age-1.3 Proportion	Age-1.3 Number	Age-1.4 Proportion	Age-1.4 Number	Total Proportion	Total Number
Winter Troll	Alaska	0.420		0.421	3	0.195	1	0.359	4
	B.C./Wa./Or.	0.580		0.579	5	0.805	2	0.641	7
	Total		0		8		3		11
Summer Troll	Alaska	0.420	285	0.421	41	0.195	6	0.412	332
	B.C./Wa./Or.	0.580	394	0.579	56	0.805	24	0.588	474
	Total		679[a]		97		30		806
Seine	Alaska	0.420	3	0.421		0.195		0.420	3
	B.C./Wa./Or.	0.580	4	0.579		0.805		0.580	4
	Total		7[b]		0		0		7
Gill Net	Alaska	0.420	9	0.421		0.195		0.420	9
	B.C./Wa./Or.	0.580	12	0.579		0.805		0.580	12
	Total		21[c]		0		0		21

[a] Includes the two age-1.1 fish recovered.

[b] Includes the four age-1.1 fish recovered.

[c] Includes the four age-1.1 fish recovered.

Table 10. Estimated stock composition of chinook salmon harvested in the Southeast Alaska troll, seine, and gill net fisheries, 1982. The contribution of Alaska hatchery fish is estimated from coded microwire tag data.

Fishery	Time Period	Area	Stock of Origin[a]	Age Group 0.[b]	1.2,1.3,1.4[c]	1.1[d]	1.5,1.6[e]	2.,3.[e]	Total	Percent
Troll	Winter Fishery 8 March-14 April	All	Alaska Hatchery	13	11	0	0	0	24	0.4
			Alaska Wild	0	1,168	0	28	19	1,215	18.7
			B.C./Wa./Or.	3,725	1,493	0	17	14	5,249	80.9
			Total	3,738	2,672	0	45	33	6,488	100.0
	Summer Fishery 15 May-28 July	Northern Outside	Alaska Hatchery	16	255	0	0	0	271	0.2
			Alaska Wild	0	22,635	73	238	316	23,262	16.5
			B.C./Wa./Or.	88,271	27,766	119	393	574	117,123	83.3
			Total	88,287	50,656	192	631	890	140,656	100.0
		Southern Outside	Alaska Hatchery	7	66	0	0	0	73	0.2
			Alaska Wild	0	8,202	26	26	47	8,301	21.6
			B.C./Wa./Or.	20,798	8,718	40	108	344	30,008	78.2
			Total	20,805	16,986	66	134	391	38,382	100.0
		Northern Inside	Alaska Hatchery	99	251	2	0	0	352	1.4
			Alaska Wild	0	9,819	43	116	159	10,137	41.6
			B.C./Wa./Or.	9,456	4,301	28	37	81	13,903	57.0
			Total	9,555	14,371	73	153	240	24,392	100.0
		Southern Inside	Alaska Hatchery	7	232	0	0	0	239	1.0
			Alaska Wild	0	10,517	51	34	122	10,724	42.9
			B.C./Wa./Or.	8,006	5,748	28	43	217	14,042	56.2
			Total	8,013	16,497	79	77	339	25,005	100.0
	Summer Fishery Total		Alaska Hatchery	129	804	2	0	0	935	0.4
			Alaska Wild	0	51,173	193	414	644	52,424	22.9
			B.C./Wa./Or.	126,531	46,533	215	581	1,216	175,076	76.6
			Total	126,660	98,510	410	995	1,860	228,435	100.0
Seine		Dist. 104	Alaska Hatchery	0	3	4	0	0	7	0.0
			Alaska Wild	0	1,035	6	2	22	1,065	5.0
			B.C./Wa./Or.	17,708	2,430	14	22	232	20,406	95.0
			Total	17,708	3,468	24	24	254	21,478	100.0
Gill Net		Dist 101, 111	Alaska Hatchery	0	17	4	0	0	21	0.3
			Alaska Wild	0	4,873	107	33	67	5,080	66.8
			B.C./Wa./Or.	978	1,485	31	3	5	2,502	32.9
			Total	978	6,375	142	36	72	7,603	100.0
Total All Fisheries			Alaska Hatchery	142	835	10	0	0	987	0.4
			Alaska Wild	0	58,249	306	477	752	59,784	22.6
			B.C./Wa./Or.	148,942	51,941	260	623	1,467	203,233	77.0
			Total	149,084	111,025	576	1,100	2,219	264,004	100.0

[a] The harvest of Alaskan hatchery fish is based on CWT data. Age composition and scale pattern analysis estimates of the harvest of Alaskan wild and B.C./Wa./Or. fish are adjusted downward by the CWT estimate of Alaskan hatchery fish harvested.
[b] Stock classification based on age composition data.
[c] Stock classification based on scale pattern analysis.
[d] These age-1.1 fish were classified to stock of origin using the proportions derived from the combined age-1.2, 1.3, and 1.4 Alaska vs B.C./Wa./Or. scale pattern model.
[e] These age-1.5, 1.6, 2. and 3. fish were classified to stock of origin using the proportions derived from the age-1.4 Alaska vs. B.C./Wa./Or. scale pattern model.

Table 11. Estimated stock composition of chinook salmon harvested in the Southeast Alaska winter troll fishery, 8 March to 14 April, 1982. The contribution of Alaska hatchery fish is estimated from coded microwire tag data.

Area	Stock of Origin	Age Group 0.[a]	1.2,1.3,1.4[b]	1.1[c]	1.5,1.6[d]	2.,3.[d]	Total	Percent
Northern Outside	Alaska	0	583		23	15	621	19.0
	B.C./Wa./Or.	1,900	729		13	8	2,650	81.0
	Total	1,900	1,312		36	23	3,271	100.0
Southern Outside	Alaska	0	161		4		165	13.4
	B.C./Wa./Or.	833	235		2		1,070	86.6
	Total	833	396		6		1,235	100.0
Northern Inside	Alaska	0	101		1		102	12.3
	B.C./Wa./Or.	533	194		2	1	730	87.7
	Total	533	295		3	1	832	100.0
Southern Inside	Alaska	0	327			4	331	28.8
	B.C./Wa./Or.	472	342			5	819	71.2
	Total	472	669			9	1,150	100.0
Total	Alaska Hatchery	13[e]	11[f]	0	0	0	24	0.4
	Alaska Wild	0	1,168	0	28	19	1,215	18.7
	B.C./Wa./Or.	3,725	1,493	0	17	14	5,249	80.9
	Total	3,738	2,672	0	45	33	6,488	100.0

[a] Stock classification based on age composition data.

[b] Stock classification based on scale pattern analysis.

[c] These age-1.1 fish were classified to stock of origin using the proportions derived from the combined age-1.2, 1.3, and 1.4 Alaska vs B.C./Wa./Or. scale pattern model.

[d] These age-1.5, 1.6, 2. and 3. fish were classified to stock of origin using the proportions derived from the age-1.4 Alaska vs. B.C./Wa./Or. scale pattern model.

[e] Based on CWT data Alaskan hatcheries contributed 13 age-0. fish to this area.

[f] Based on CWT data Alaskan hatcheries contributed 11 age-1.2, 1.3, and 1.4 fish to this area, 4 were likely classified to the Alaska stock and 7 were likely classified to the non-Alaska stock.

Table 12. Estimated stock composition of chinook salmon harvested in the Southeast Alaska summer troll fishery, Northern Outside Area, 1982. The contribution of Alaska hatchery fish is estimated from coded microwire tag data.

Date	Stock of Origin	Age Group 0.[a]	1.2,1.3,1.4[b]	1.1[c]	1.5,1.6[d]	2.,3.[d]	Total	Percent
5/15-5/29	Alaska	0	5,941	0	55	73	6,069	34.2
	B.C./Wa./Or.	7,916	3,732	0	8	11	11,667	65.8
	Total	7,916	9,673	0	63	84	17,736	100.0
5/30-6/05	Alaska	0	3,567	0	50	50	3,667	23.7
	B.C./Wa./Or.	7,889	3,819	0	34	34	11,776	76.3
	Total	7,889	7,386	0	84	84	15,443	100.0
6/06-6/19	Alaska	0	3,189	26	57	81	3,353	14.0
	B.C./Wa./Or.	14,872	5,344	44	117	163	20,540	86.0
	Total	14,872	8,533	70	174	244	23,893	100.0
6/20-6/26	Alaska	0	2,686	6	33	57	2,782	14.5
	B.C./Wa./Or.	11,612	4,587	10	78	134	16,421	85.5
	Total	11,612	7,273	16	111	191	19,203	100.0
6/27-7/03	Alaska	0	2,115	0	16	38	2,169	15.4
	B.C./Wa./Or.	8,362	3,440	0	44	102	11,948	84.6
	Total	8,362	5,555	0	60	140	14,117	100.0
7/4-7/10	Alaska	0	927	0	13	4	944	10.0
	B.C./Wa./Or.	6,820	1,564	0	76	22	8,482	90.0
	Total	6,820	2,491	0	89	26	9,426	100.0
7/11-7/17	Alaska	0	1,133	25	0	1	1,159	7.9
	B.C./Wa./Or.	11,112	2,287	50	0	49	13,498	92.1
	Total	11,112	3,420	75	0	50	14,657	100.0
7/18-7/24	Alaska	0	1,171	5	2	12	1,190	9.9
	B.C./Wa./Or.	9,120	1,601	7	10	59	10,797	90.1
	Total	9,120	2,772	12	12	71	11,987	100.0
7/25-7/28	Alaska	0	2,013	11	12	0	2,036	14.3
	B.C./Wa./Or.	10,584	1,540	8	26	0	12,158	85.7
	Total	10,584	3,553	19	38	0	14,194	100.0
Total	Alaska Hatchery	16[e]	255[f]	0	0	0	271	0.2
	Alaska Wild	0	22,635	73	238	316	23,262	16.5
	B.C./Wa./Or.	88,271	27,766	119	393	574	117,123	83.3
	Total	88,287	50,656	192	631	890	140,656	100.0

[a] Stock classification based on age composition data.
[b] Stock classification based on scale pattern analysis.
[c] These age-1.1 fish were classified to stock of origin using the proportions derived from the combined age-1.2, 1.3, and 1.4 Alaska vs B.C./Wa./Or. scale pattern model.
[d] These age-1.5, 1.6, 2. and 3. fish were classified to stock of origin using the proportions derived from the age-1.4 Alaska vs. B.C./Wa./Or. scale pattern model.
[e] Based on CWT data Alaskan hatcheries contributed 16 age-0. fish to this area.
[f] Based on CWT data Alaskan hatcheries contributed 255 age-1.2, 1.3, and 1.4 fish to this area, 107 were likely classified to the Alaska stock and 148 were likely classified to the non-Alaska stock.

Table 13. Estimated stock composition of chinook salmon harvested in the summer troll fishery, Southern Outside Area, 1982. The contribution of Alaska hatchery fish is estimated from coded micro-wire tag data.

Date	Stock of Origin	Age Group 0.[a]	1.2,1.3,1.4[b]	1.1[c]	1.5,1.6[d]	2.,3.[d]	Total	Percent
5/15-6/12	Alaska	0	4,175	0	23	36	4,234	26.9
	B.C./Wa./Or.	7,990	3,387	0	54	87	11,518	73.1
	Total	7,990	7,562	0	77	123	15,752	100.0
6/13-7/10	Alaska	0	2,929	0	3	11	2,943	20.1
	B.C./Wa./Or.	7,836	3,667	0	41	164	11,708	79.9
	Total	7,836	6,596	0	44	175	14,651	100.0
7/11-7/28	Alaska	0	1,126	26	0	0	1,152	14.4
	B.C./Wa./Or.	4,979	1,702	40	13	93	6,827	85.6
	Total	4,979	2,828	66	13	93	7,979	100.0
Total	Alaska Hatchery	7[e]	66[f]	0	0	0	73	0.2
	Alaska Wild	0	8,202	26	26	47	8,301	21.6
	B.C./Wa./Or.	20,798	8,718	40	108	344	30,008	78.2
	Total	20,805	16,986	66	134	391	38,382	100.0

[a] Stock classification based on age composition data.
[b] Stock classification based on scale pattern analysis.
[c] These age-1.1 fish were classified to stock of origin using the proportions derived from the combined age-1.2, 1.3, and 1.4 Alaska vs B.C./Wa./Or. scale pattern model.
[d] These age-1.5, 1.6, 2. and 3. fish were classified to stock of origin using the proportions derived from the age-1.4 Alaska vs. B.C./Wa./Or. scale pattern model.
[e] Based on CWT data Alaskan hatcheries contributed 7 age-0. fish to this area.
[f] Based on CWT data Alaskan hatcheries contributed 66 age-1.2, 1.3, and 1.4 fish to this area, 28 were likely classified to the Alaska stock and 38 were likely classified to the non-Alaska stock.

Table 14. Estimated stock composition of chinook salmon harvested in the summer troll fishery, Northern Inside Area, 1982. The contribution of Alaska hatchery fish is estimated from coded micro-wire tag data.

Date	Stock of Origin	Age Group 0.[a]	1.2,1.3,1.4[b]	1.1[c]	1.5,1.6[d]	2.,3.[d]	Total	Percent
5/15-6/05	Alaska	0	1,856	0	52	35	1,943	45.6
	B.C./Wa./Or.	1,609	674	0	19	13	2,315	54.4
	Total	1,609	2,530	0	71	48	4,258	100.0
6/06-6/26	Alaska	0	2,886	0	51	40	2,977	41.8
	B.C./Wa./Or.	2,859	1,268	0	7	5	4,139	58.2
	Total	2,859	4,154	0	58	45	7,116	100.0
6/27-7/17	Alaska	0	3,537	0	5	84	3,626	43.7
	B.C./Wa./Or.	3,184	1,428	0	4	63	4,679	56.3
	Total	3,184	4,965	0	9	147	8,305	100.0
7/18-7/28	Alaska	0	1,639	44	8	0	1,691	35.9
	B.C./Wa./Or.	1,903	1,083	29	7	0	3,022	64.1
	Total	1,903	2,722	73	15	0	4,713	100.0
Total	Alaska Hatchery	99[e]	251[f]	2	0	0	352	1.4
	Alaska Wild	0	9,819	43	116	159	10,137	41.6
	B.C./Wa./Or.	9,456	4,301	28	37	81	13,903	57.0
	Total	9,555	14,371	73	153	240	24,392	100.0

[a] Stock classification based on age composition data.

[b] Stock classification based on scale pattern analysis.

[c] These age-1.1 fish were classified to stock of origin using the proportions derived from the combined age-1.2, 1.3, and 1.4 Alaska vs B.C./Wa./Or. scale pattern model.

[d] These age-1.5, 1.6, 2. and 3. fish were classified to stock of origin using the proportions derived from the age-1.4 Alaska vs. B.C./Wa./Or. scale pattern model.

[e] Based on CWT data Alaskan hatcheries contributed 99 age-0. fish to this area.

[f] Based on CWT data Alaskan hatcheries contributed 251 age-1.2, 1.3, and 1.4 fish to this area, 99 were likely classified to the Alaska stock and 152 were likely classified to the non-Alaska stock.

Table 15. Estimated stock composition of chinook salmon harvested in the summer troll fishery, Southern Inside Area, 1982. The contribution of Alaska hatchery fish is estimated from coded micro-wire tag data.

Date	Stock of Origin	Age Group 0.[a]	1.2,1.3,1.4[b]	1.1[c]	1.5,1.6[d]	2.,3.[d]	Total	Percent
5/15-7/03	Alaska	0	6,693	0	28	83	6,804	44.8
	B.C./Wa./Or.	4,535	3,767	0	17	50	8,369	55.2
	Total	4,535	10,460	0	45	133	15,173	100.0
7/04-7/28	Alaska	0	3,921	51	6	39	4,017	40.9
	B.C./Wa./Or.	3,478	2,116	28	26	167	5,815	59.1
	Total	3,478	6,037	79	32	206	9,832	100.0
Total	Alaska Hatchery	7[e]	232[f]	0	0	0	239	0.9
	Alaska Wild	0	10,517	51	34	122	10,724	42.9
	B.C./Wa./Or.	8,006	5,748	28	43	217	14,042	56.2
	Total	8,013	16,497	79	77	339	25,005	100.0

[a] Stock classification based on age composition data.

[b] Stock classification based on scale pattern analysis.

[c] These age-1.1 fish were classified to stock of origin using the proportions derived from the combined age-1.2, 1.3, and 1.4 Alaska vs B.C./Wa./Or. scale pattern model.

[d] These age-1.5, 1.6, 2. and 3. fish were classified to stock of origin using the proportions derived from the age-1.4 Alaska vs. B.C./Wa./Or. scale pattern model.

[e] Based on CWT data Alaskan hatcheries contributed 7 age-0. fish to this area.

[f] Based on CWT data Alaskan hatcheries contributed 232 age-1.2, 1.3, and 1.4 fish to this area, 97 were likely classified to the Alaska stock and 135 were likely classified to the non-Alaska stock.

Table 16. Comparison of the SPA and CWT based estimates of the catch of age-1.2, -1.3, and -1.4 Alaska hatchery chinook salmon in Southeast Alaska troll and net fisheries, 1982.

Fishery/ Area	Age-1.2			Age-1.3			Age-1.4			Total		
	SPA	CWT	Difference	SPA	CWT	Difference	SPA	CWT	Difference	SPA	CWT	Difference
Winter Troll:	0	0	-	179	8	2238%	0	3	0%	179	11	1627%
Summer Troll:												
Northern Outside	271	213	127%	3415	40	8538%	1978	2	98900%	5664	255	2221%
Southern Outside	280	49	571%	191	17	1124%	21	0	-	492	66	745%
Northern Inside	386	194	199%	210	31	677%	133	26	512%	729	251	290%
Southern Inside	182	221	82%	305	9	3389%	37	2	1850%	524	232	226%
Seine: (Dist. 104)	0	3	0%	0	0	-	36	0	-	36	3	1200%
Gill Net: (Dist. 101&111)	0	17	0%	0	0	-	0	0	-	0	0	-

Table 17. Comparison of coefficient of variations between SPA- and CWT-based estimates of the catch of age-1.2, -1.3, and -1.4 Alaska hatchery chinook salmon in the Southeast Alaska summer troll fishery, 1982.

Age Group		SPA Estimate	CWT Estimate
Age-1.2	Catch	1,119	677
	Standard Error (of catch)	341[a]	29
	Coefficient of Variation	30	4
	Sample Size	51[b]	296[c]
Age-1.3	Catch	4,121	97
	Standard Error (of catch)	719[a]	14
	Coefficient of Variation	17	14
	Sample Size	61[b]	38[c]
Age-1.4	Catch	2,170	30
	Standard Error (of catch)	237[a]	7
	Coefficient of Variation	11	23
	Sample Size	70[b]	16[c]

[a] Calculated using the formula of Goodman (1960) for the exact variance of a product of two independent random variables.

[b] Sample size in the number of scales digitized in the mixed stock sample that were classified to the Alaska hatchery group after the model was adjusted for misclassification rates between groups.

[c] Sample size is the number of tagged Alaska hatchery fish recovered of that age.

Table 18. Comparison of age compositions between catches and escapements of Southeast Alaska origin chinook salmon, 1982.

Escapement (Data from Appendix B.1)

Age	Number in Escapement	Percents for Ages 1.2, 1.3, and 1.4	Percents for Ages 1.3 and 1.4	Percents for Ages 1.2 and 1.3
1.2	2,410	7.8	-	21.9
1.3	8,580	27.6	30.0	78.1
1.4	20,057	64.6	70.0	-

Catch (Data from Appendix C.6 - C.9)

Age	Number in Catch	Percents for Ages 1.2, 1.3, and 1.4	Percents for Ages 1.3 and 1.4	Percents for Ages 1.2 and 1.3
1.2	10,484	22.4	-	27.7
1.3	27,355	58.5	75.5	72.3
1.4	8,902	19.1	24.5	-

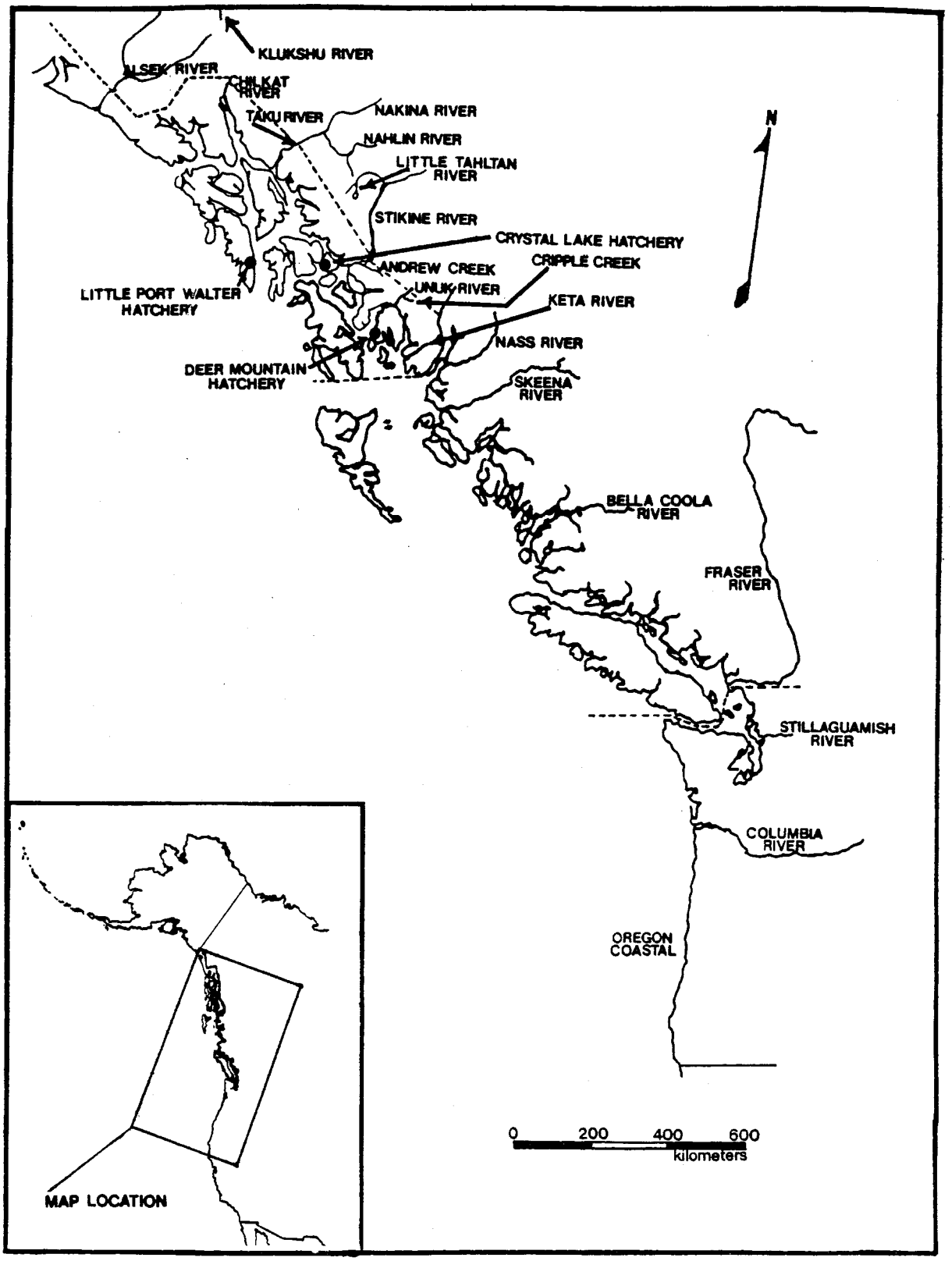


Figure 1. Rivers and hatcheries in Southeast Alaska, British Columbia, Washington, and Oregon that have substantial runs of age-1. chinook salmon.

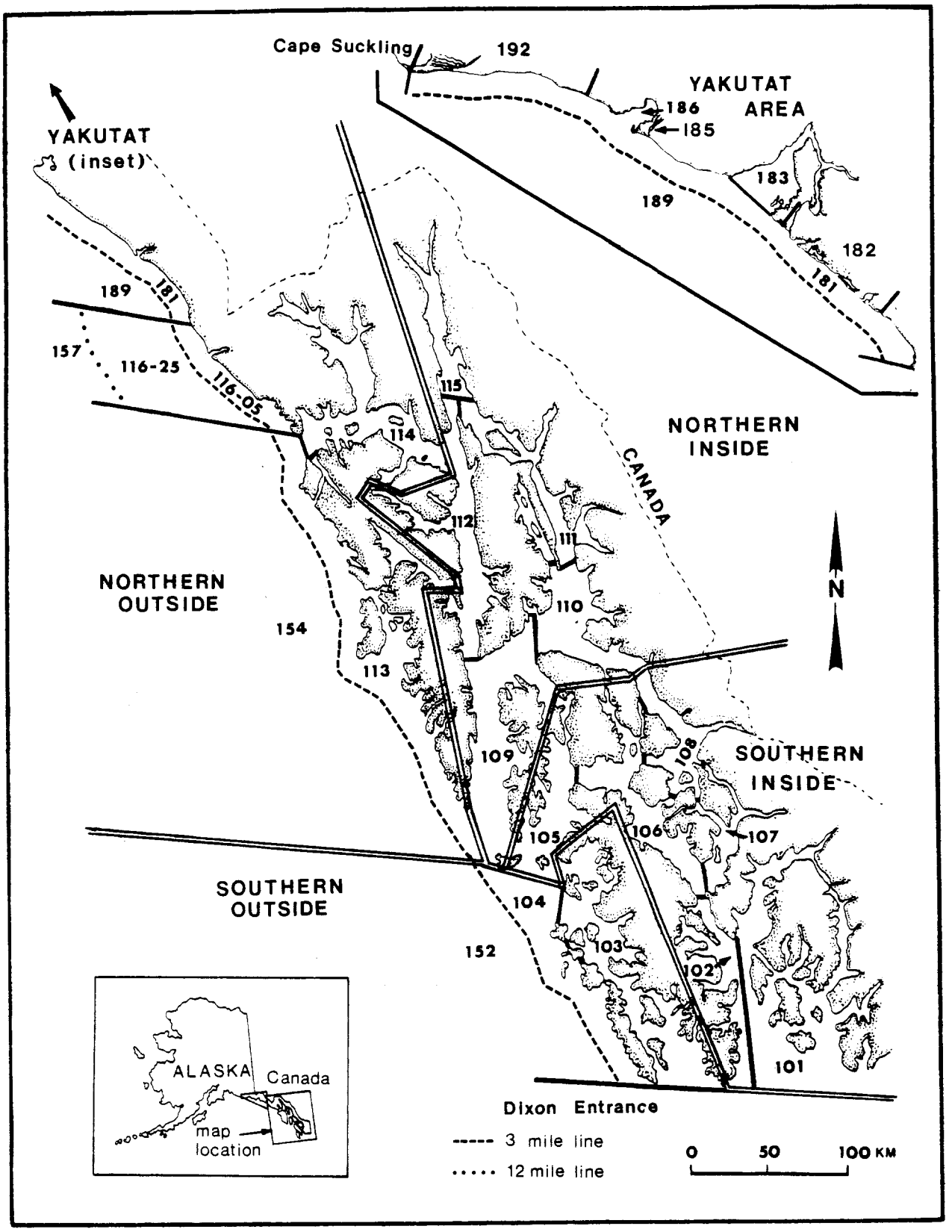


Figure 2. Map of Southeast Alaska showing the 1982 statistical fishing districts and four areas used for analysis of the troll data.

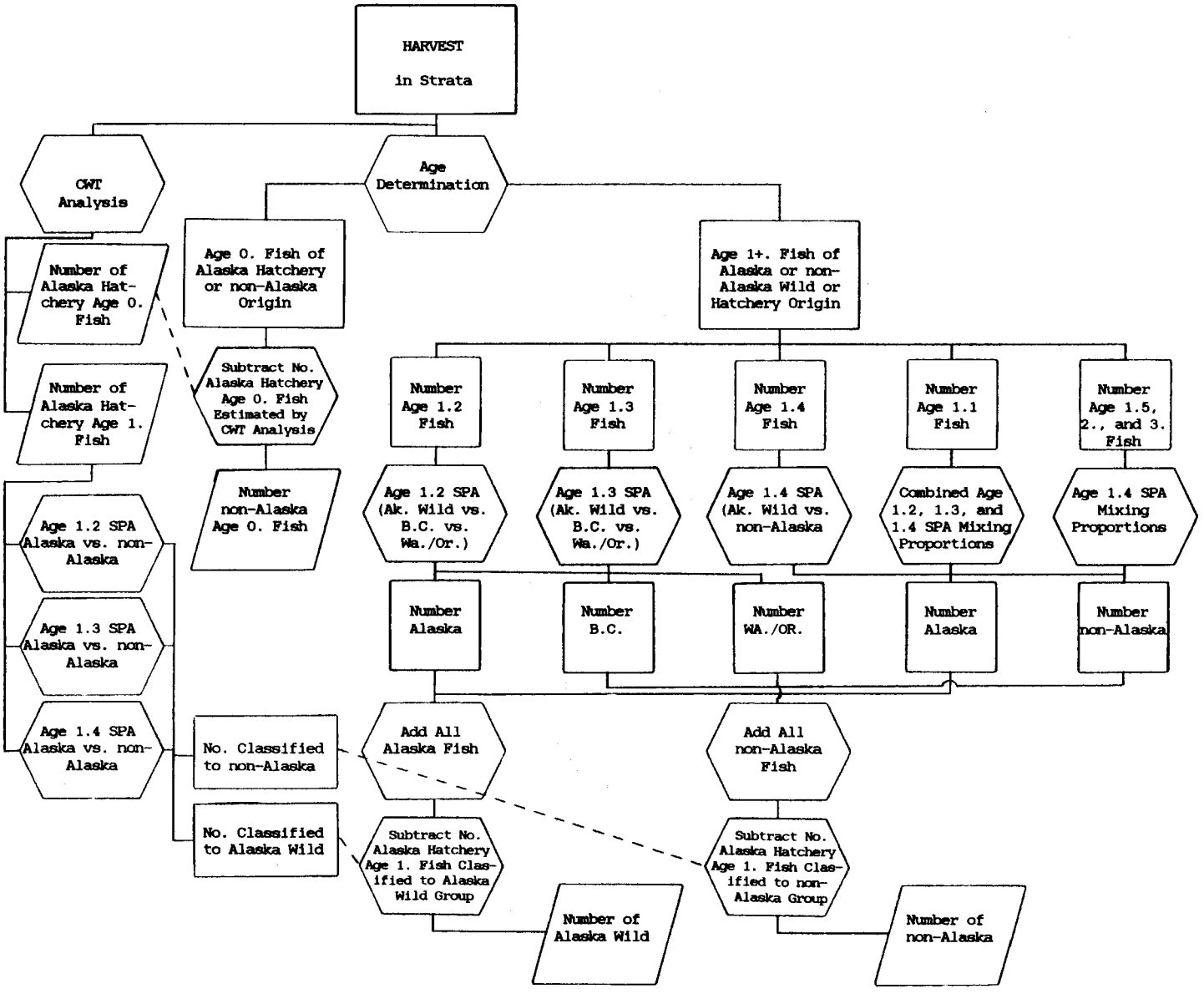


Figure 3. Flow chart of steps used to estimate contribution of Alaskan hatchery, Alaskan wild, and non-Alaskan chinook salmon to Southeast Alaska fisheries based on analysis of age composition, scale pattern and coded microwire tag data.

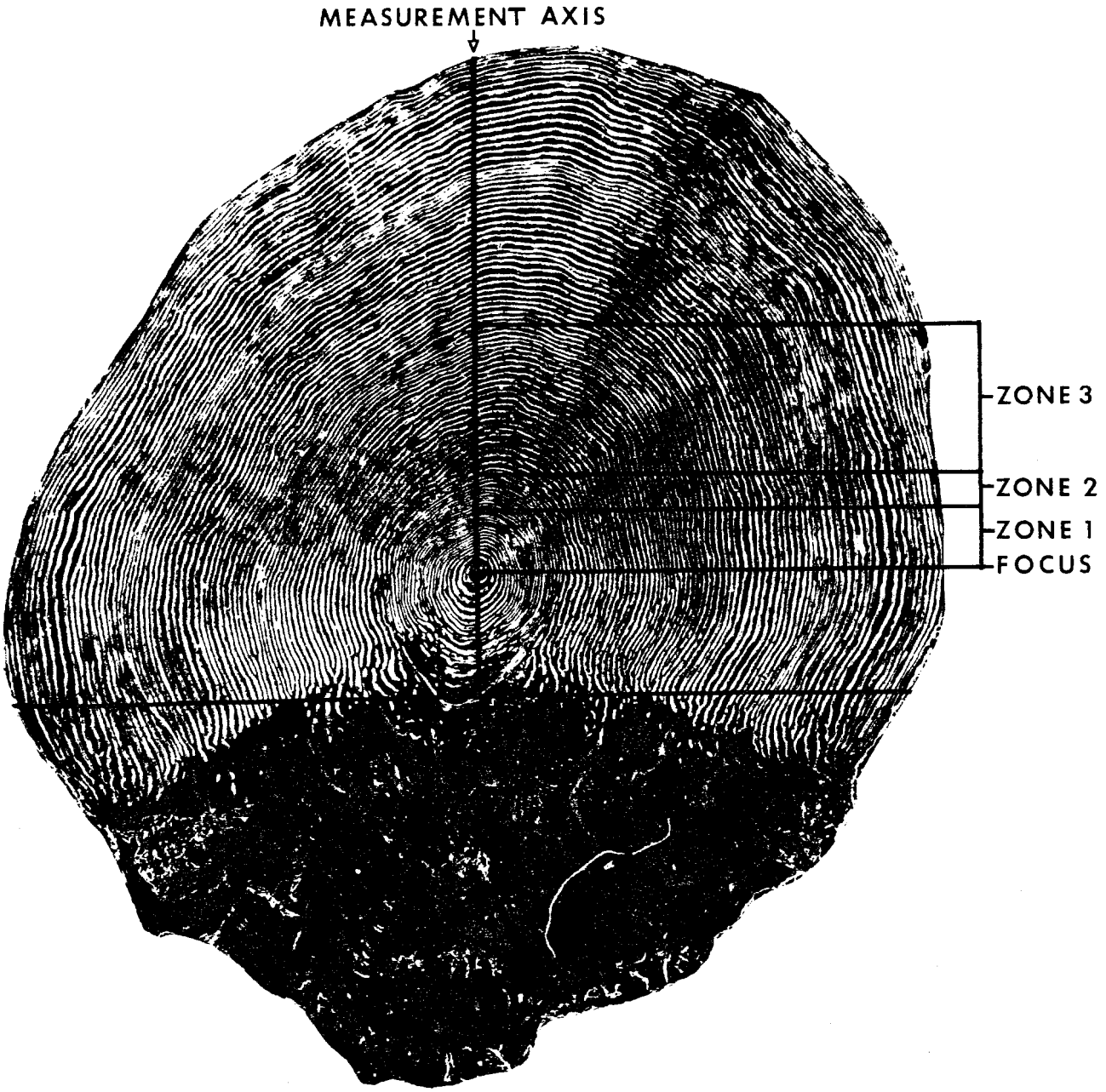


Figure 4. Age-1.3 chinook salmon scale showing the measurement axis and three scale zones measured for the scale pattern analysis (from Myers and Rogers 1983).

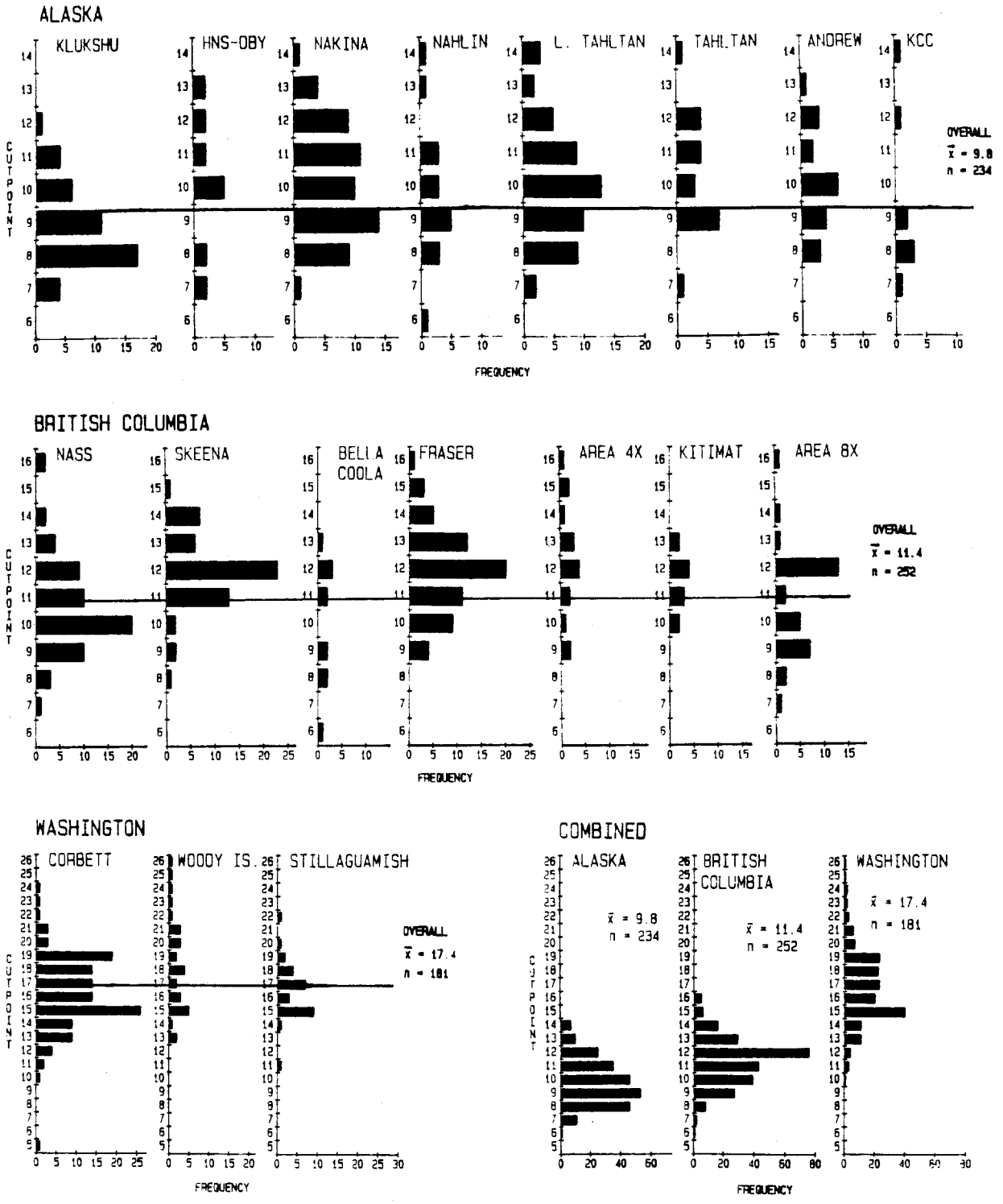


Figure 5. Frequency distributions of the number of circuli in the freshwater annular zone (scale variable #1) measured from scales of age-1.3 chinook salmon sampled from rivers in Alaska, British Columbia, and Washington-Oregon, 1982.

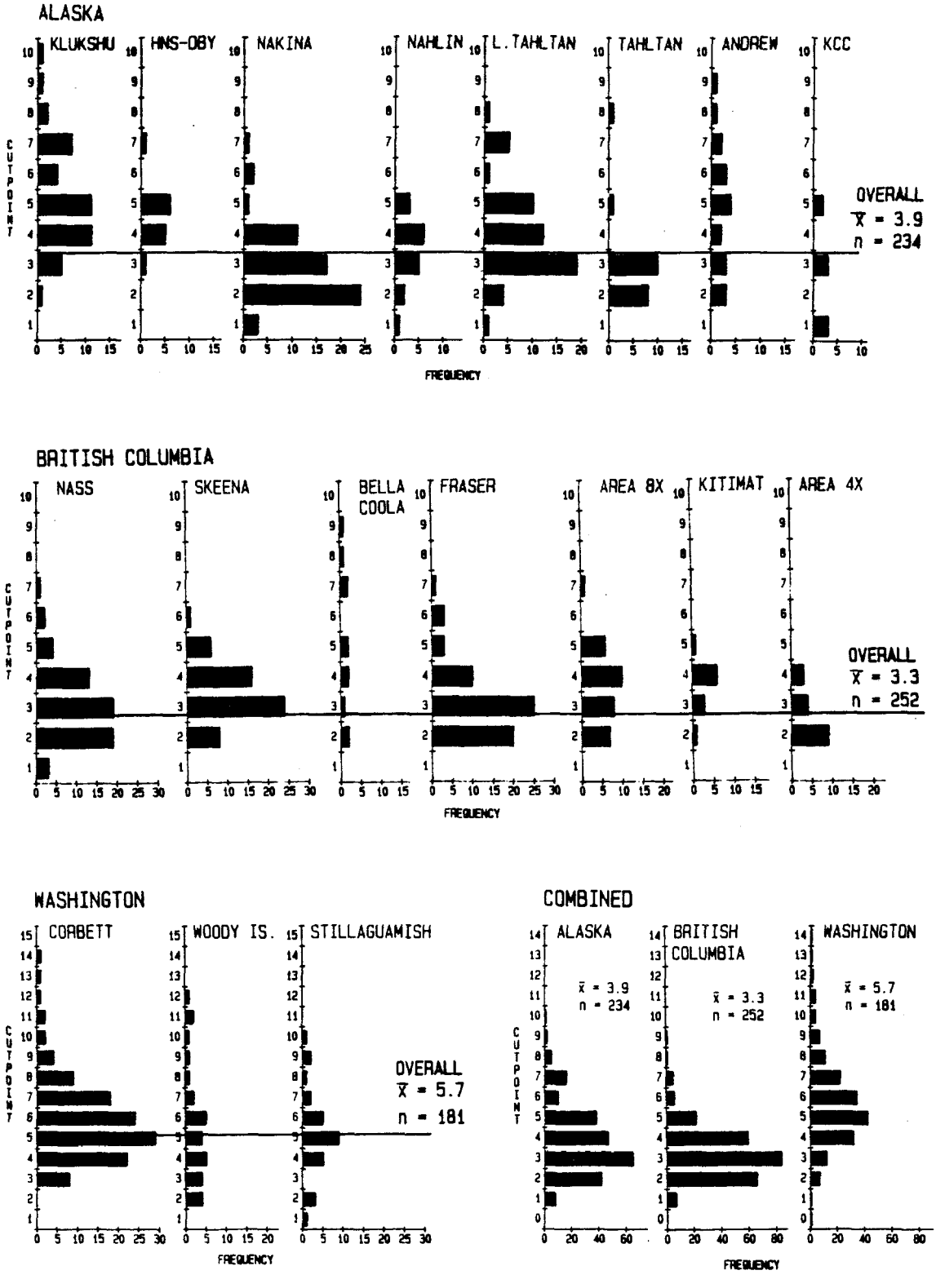


Figure 6. Frequency distributions of the number of circuli in the freshwater plus growth zone (scale variable #61) measured from scales of age-1.3 chinook salmon sampled from rivers in Alaska, British Columbia, and Washington-Oregon, 1982.

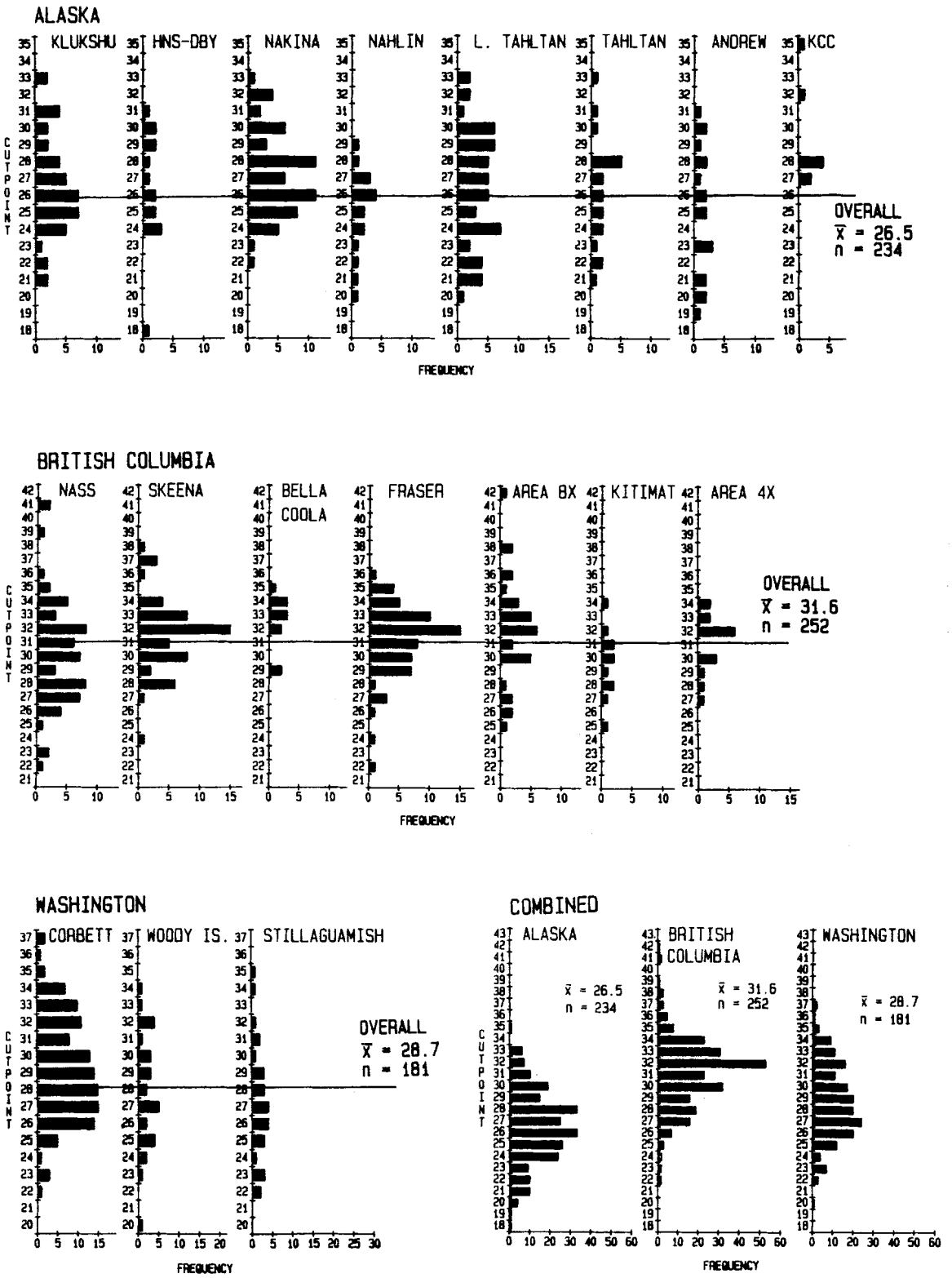


Figure 7. Frequency distributions of the number of circuli in the first marine annular zone (scale variable #70) measured from scales of age-1.3 chinook salmon sampled from rivers in Alaska, British Columbia, and Washington-Oregon, 1982.

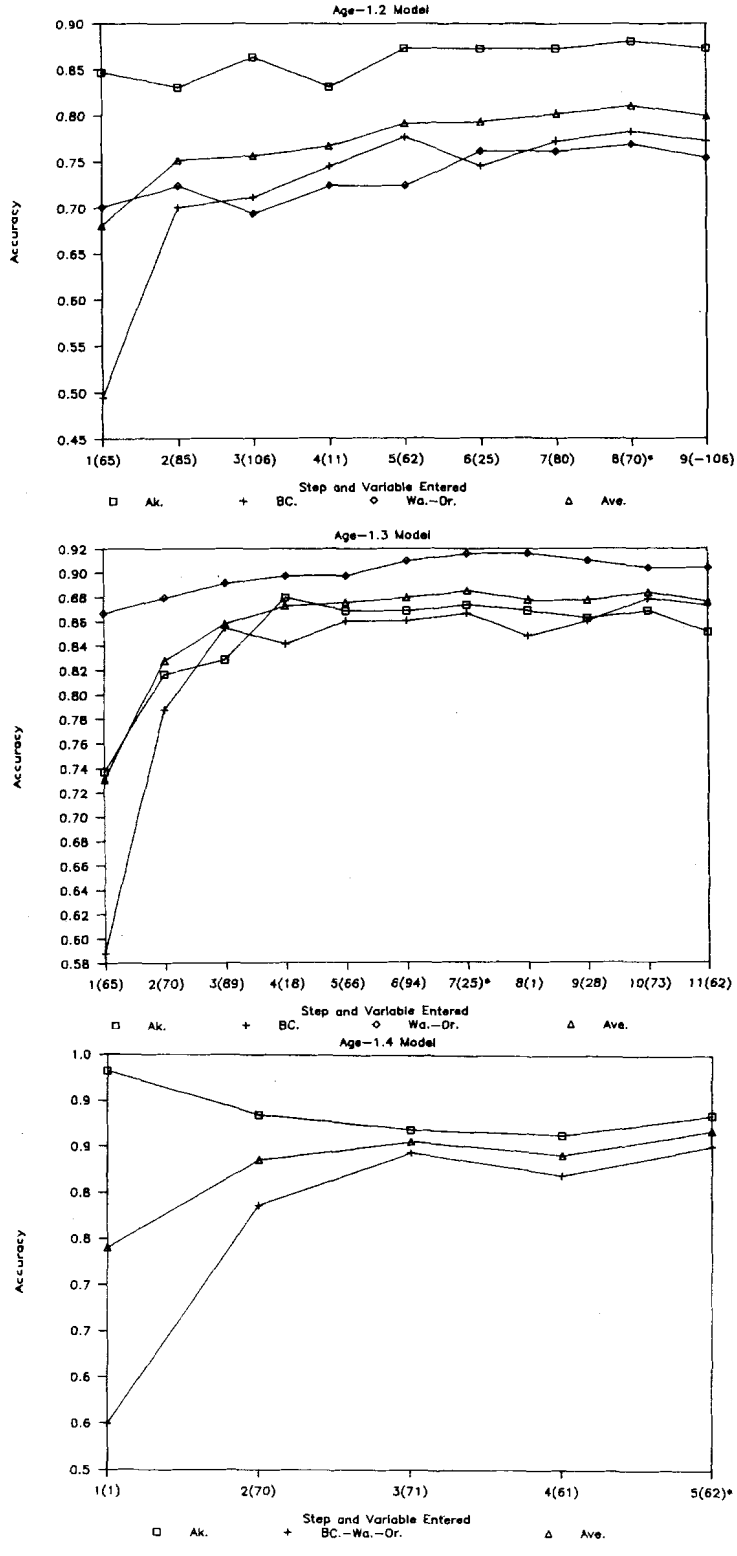


Figure 8. Classification accuracies at each step of variable inclusion in the linear discriminant function models for classification of Alaska, British Columbia, Washington-Oregon age-1.2, -1.3, and -1.4 chinook salmon. An asterisk denotes the step/model with the highest average accuaracy and the one used for classification of mixed stock samples.

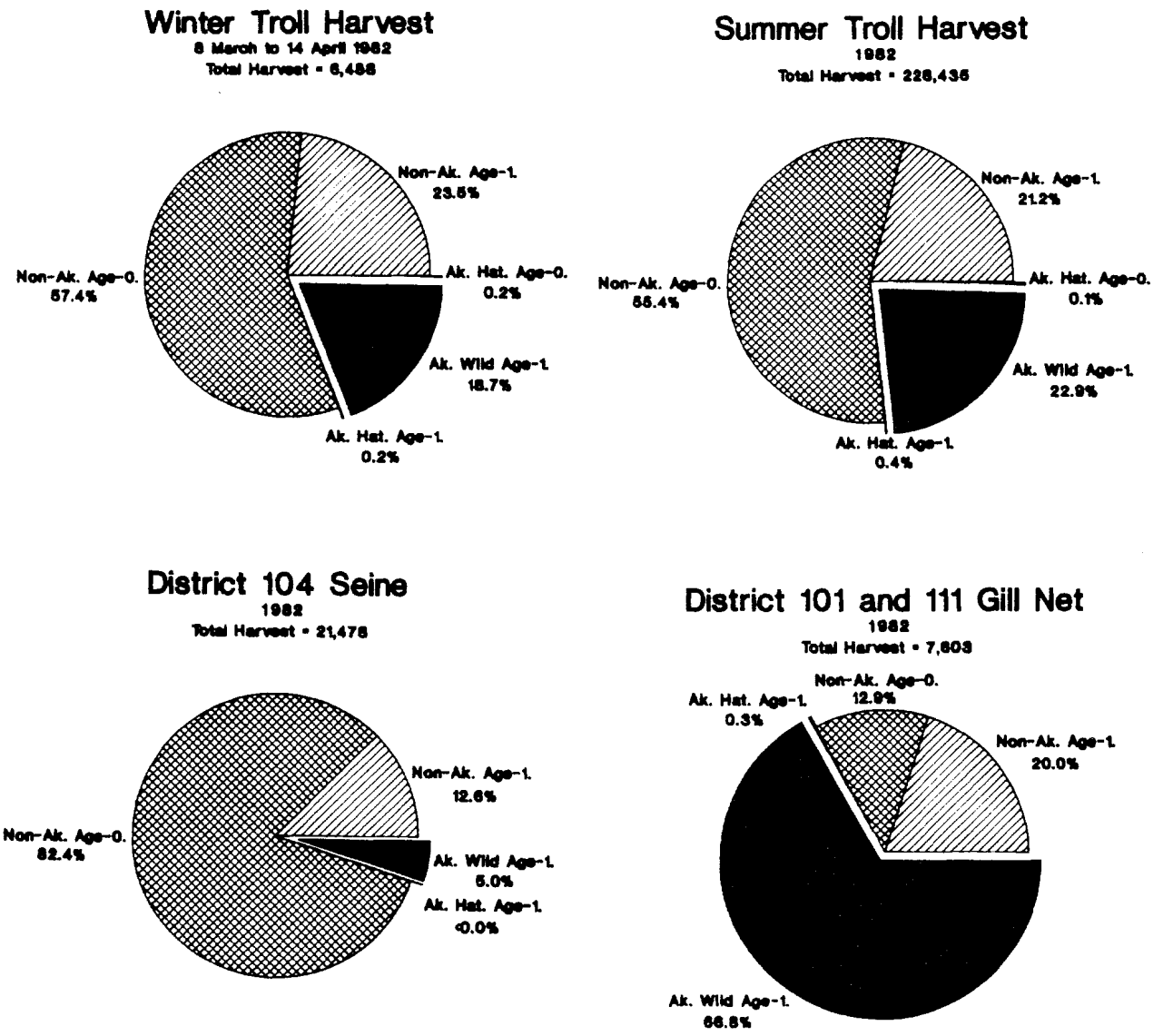


Figure 9. Stock composition of chinook salmon harvested in the Southeast Alaska troll and net fisheries, 1982.

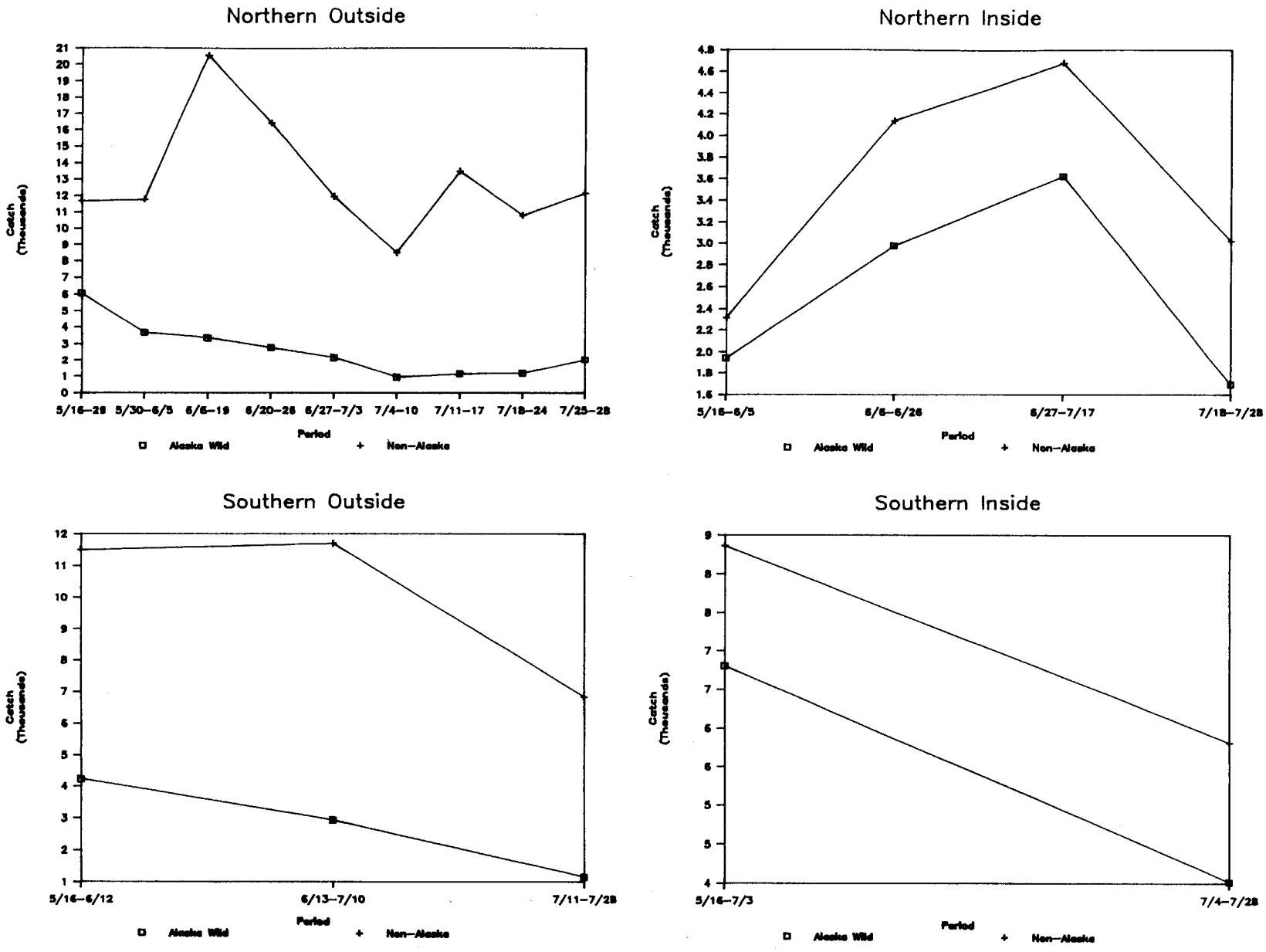


Figure 10. Catch of Alaskan and non-Alaskan chinook salmon by time and area in the Southeast Alaska summer troll fishery, 1982.

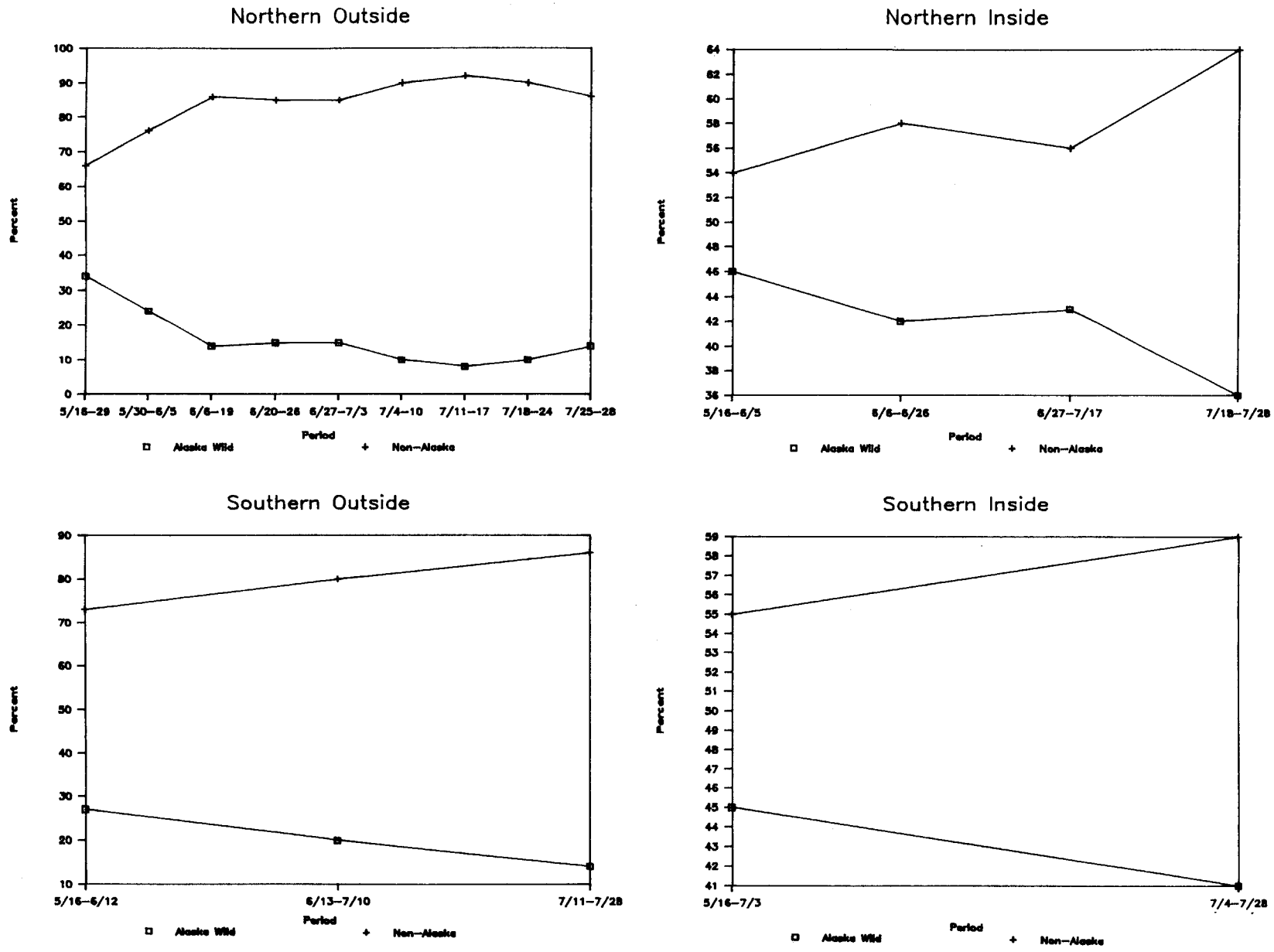


Figure 11. Percent of Alaskan and non-Alaskan chinook salmon harvested by time and area in the Southeast Alaska summer troll fishery, 1982.

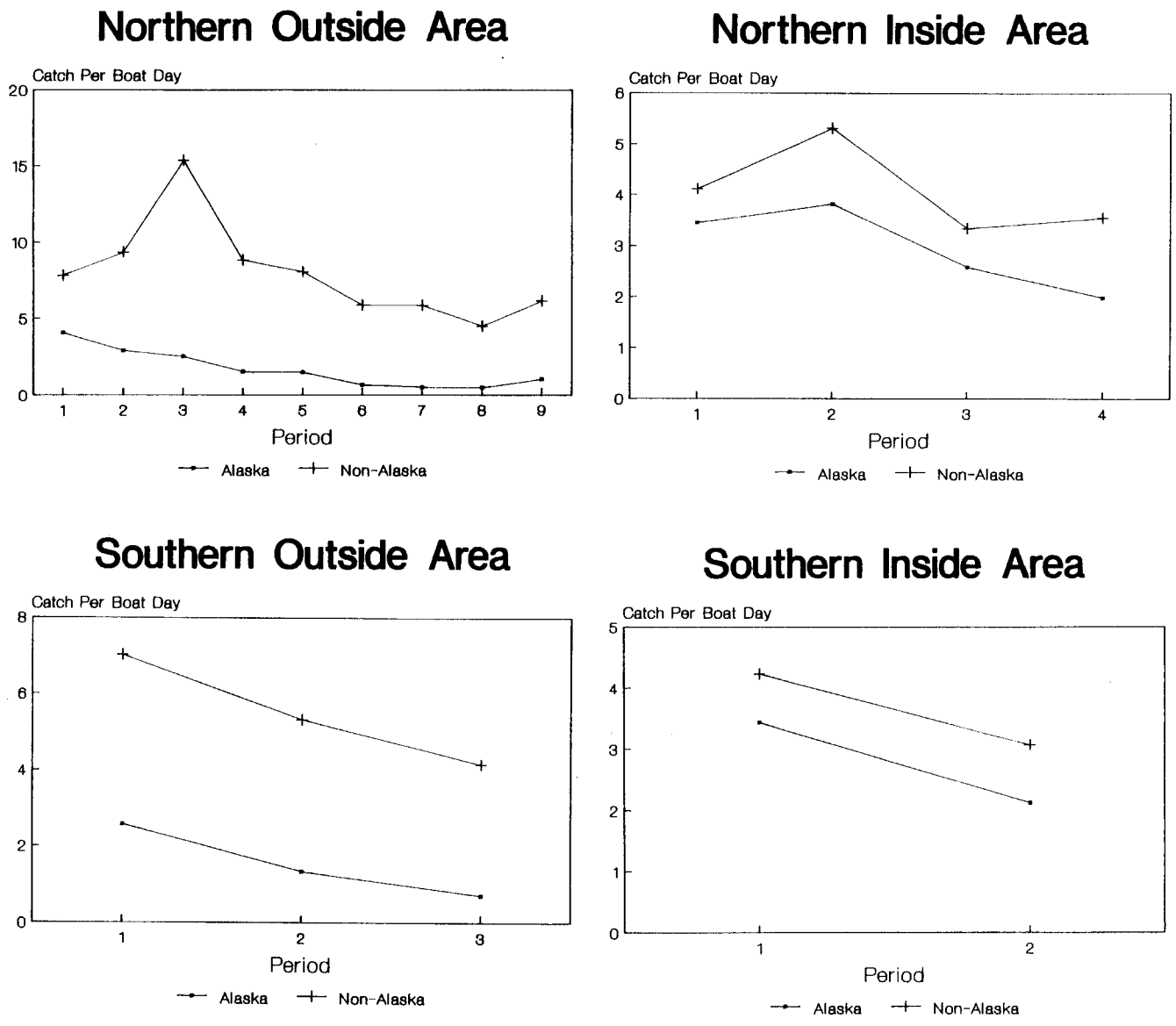


Figure 12. Catch per boat day of Alaskan and non-Alaskan chinook salmon by time and area in the Southeast Alaska summer troll fishery, 1982.

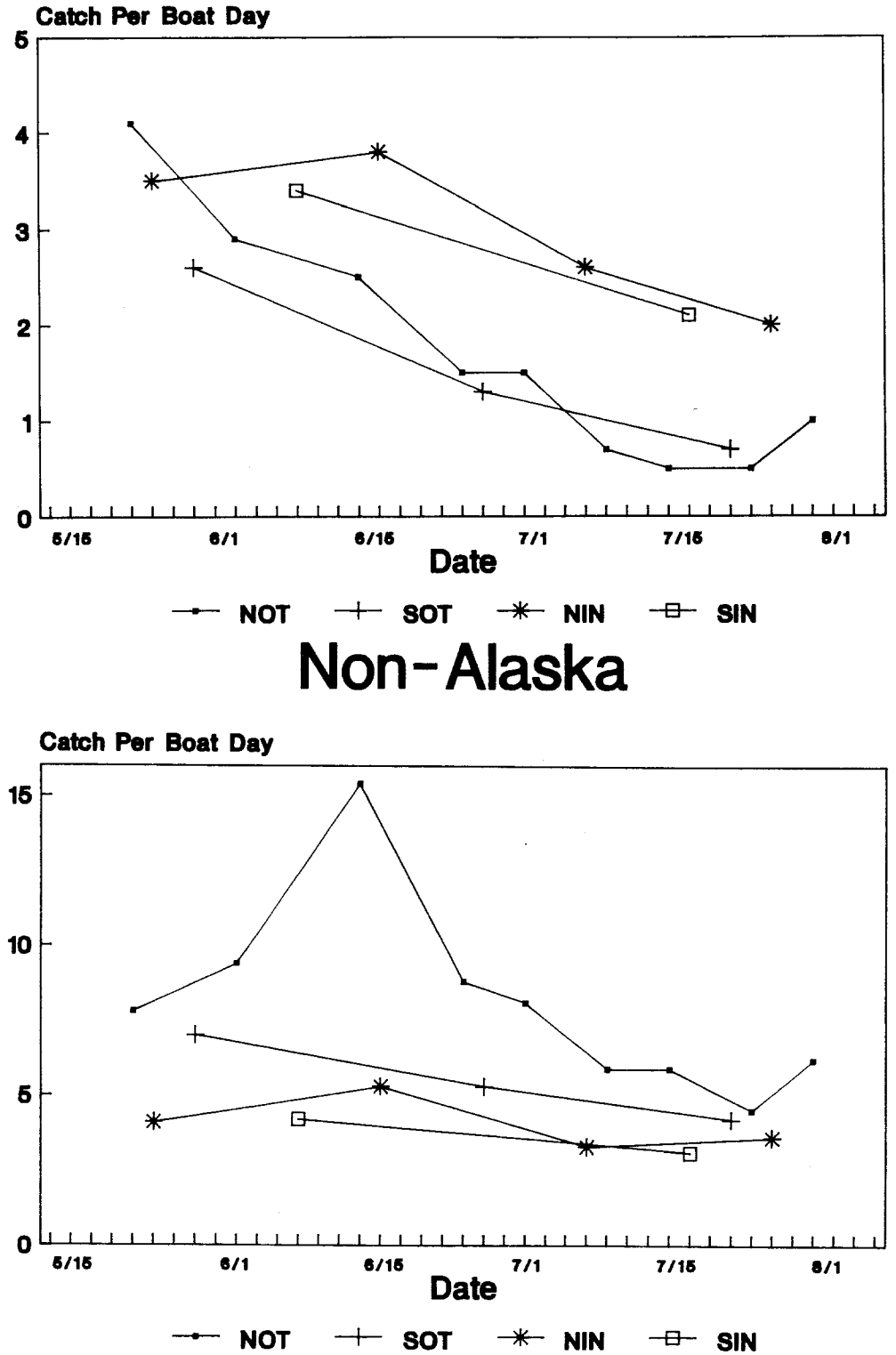


Figure 13. Catch per boat day by area and period of Alaskan and non-Alaskan chinook salmon in the Southeast Alaska summer troll fishery, 1982.

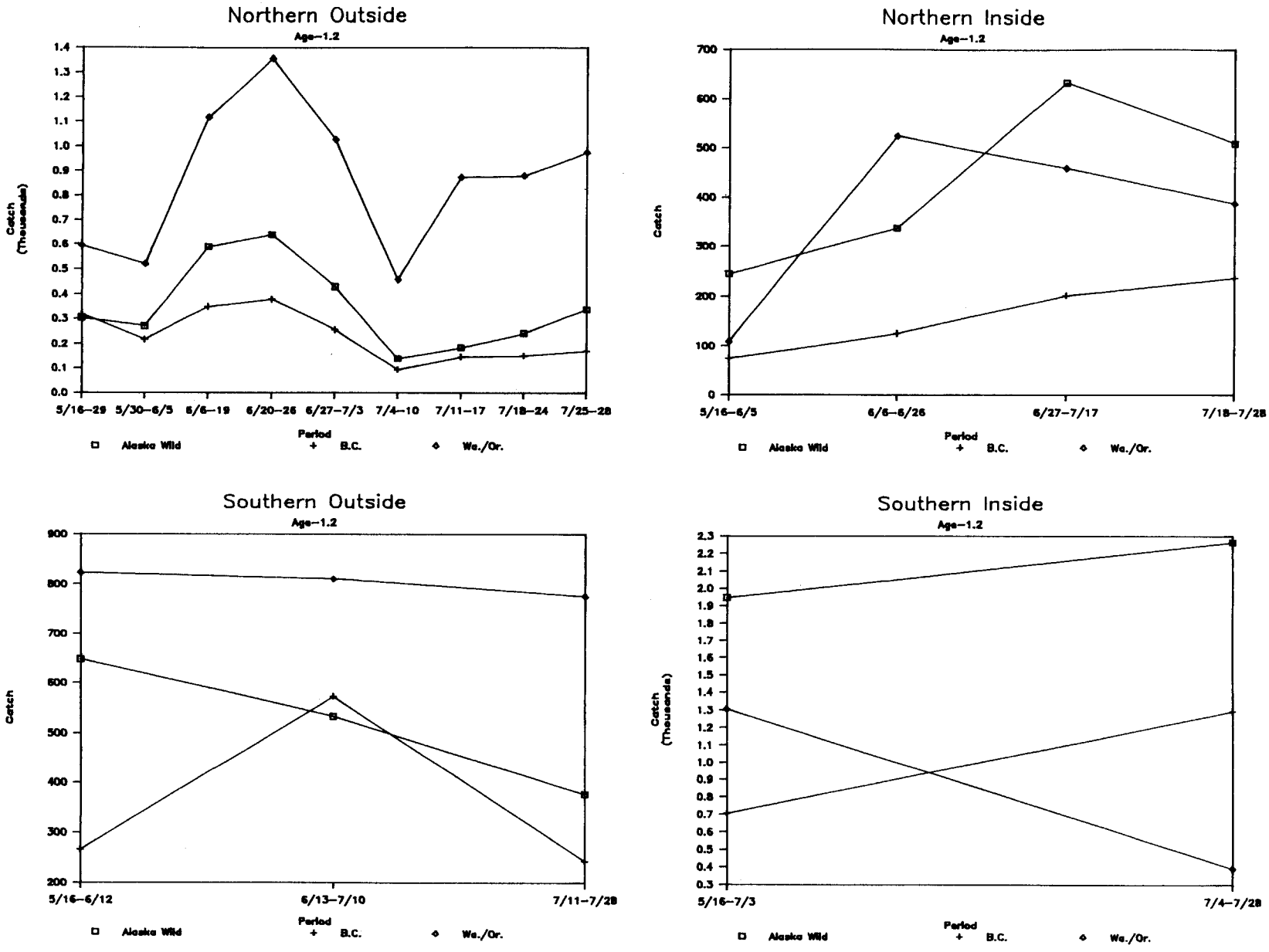


Figure 14. Catch of Alaska, British Columbia, and Washington-Oregon age-1.2 chinook salmon by time and area in the Southeast Alaska summer troll fishery, 1982.

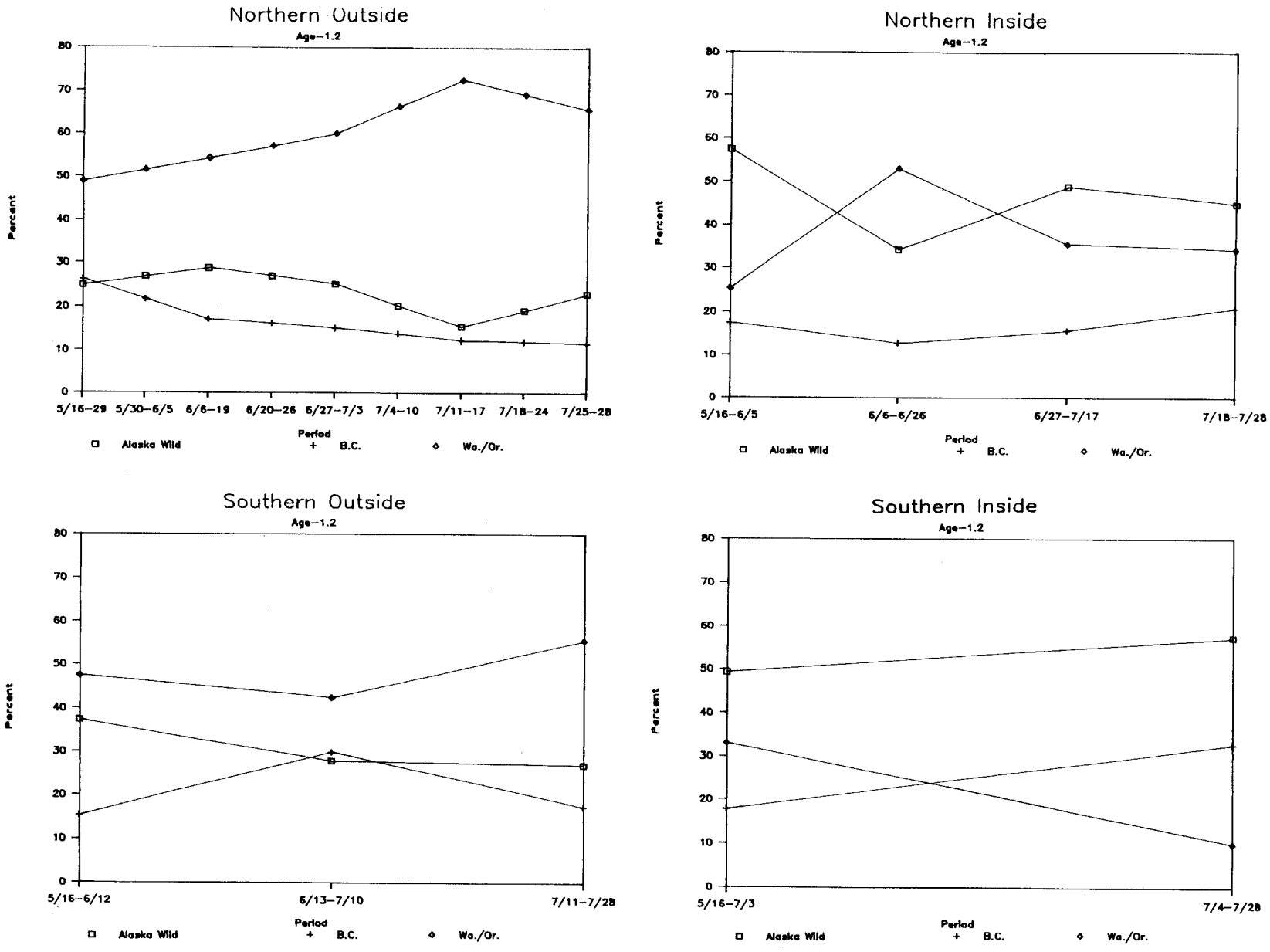


Figure 15. Percent of Alaska, British Columbia, and Washington-Oregon age-1.2 chinook salmon harvested by time and area in the Southeast Alaska summer troll fishery, 1982.

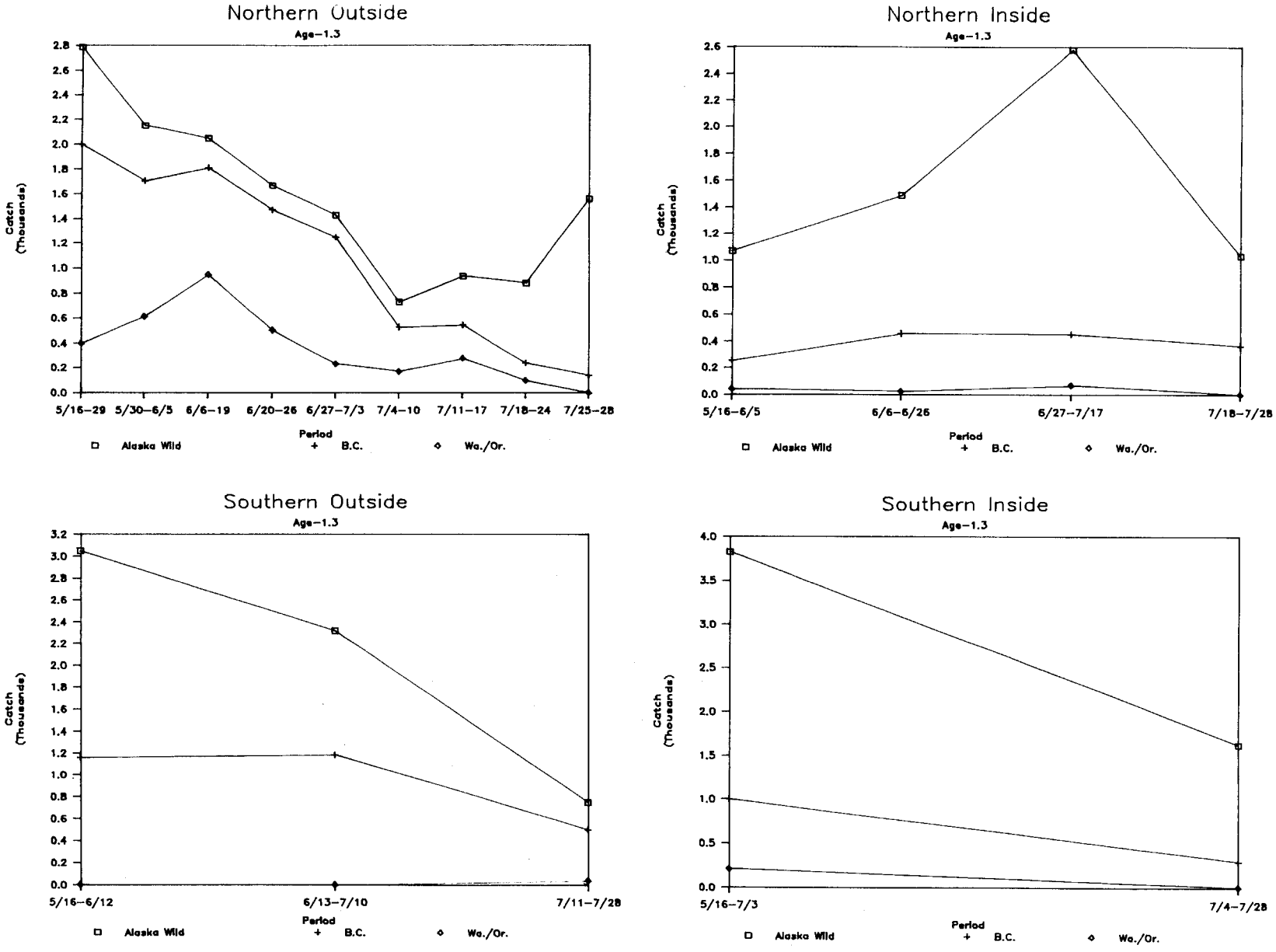


Figure 16. Catch of Alaska, British Columbia, and Washington-Oregon age-1.3 chinook salmon by time and area in the Southeast Alaska summer troll fishery, 1982.

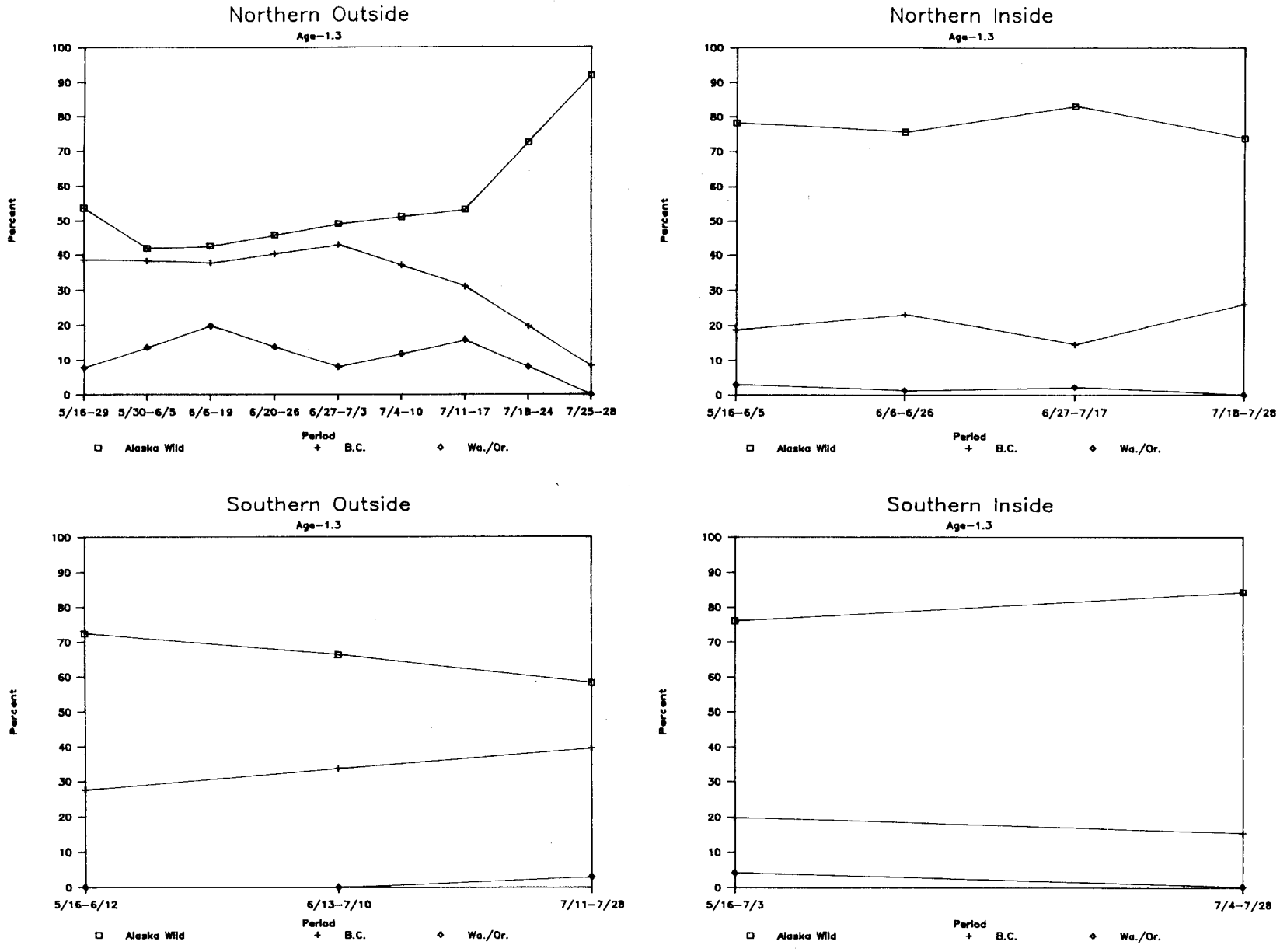


Figure 17. Percent of Alaska, British Columbia, and Washington-Oregon age-1.3 chinook salmon harvested by time and area in the Southeast Alaska summer troll fishery, 1982.

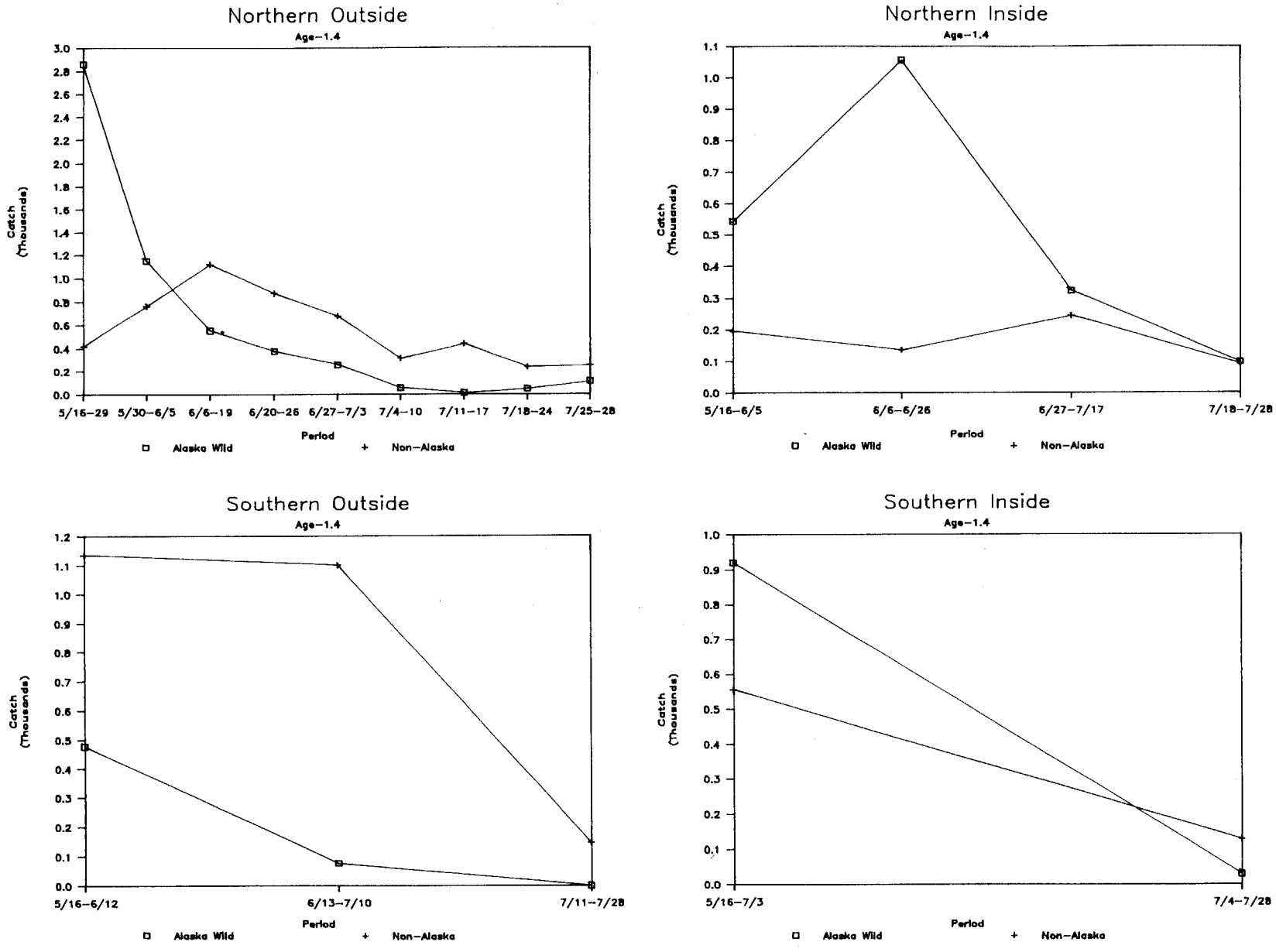


Figure 18. Catch of Alaska, British Columbia, and Washington-Oregon age-1.4 chinook salmon by time and area in the Southeast Alaska summer troll fishery, 1982.

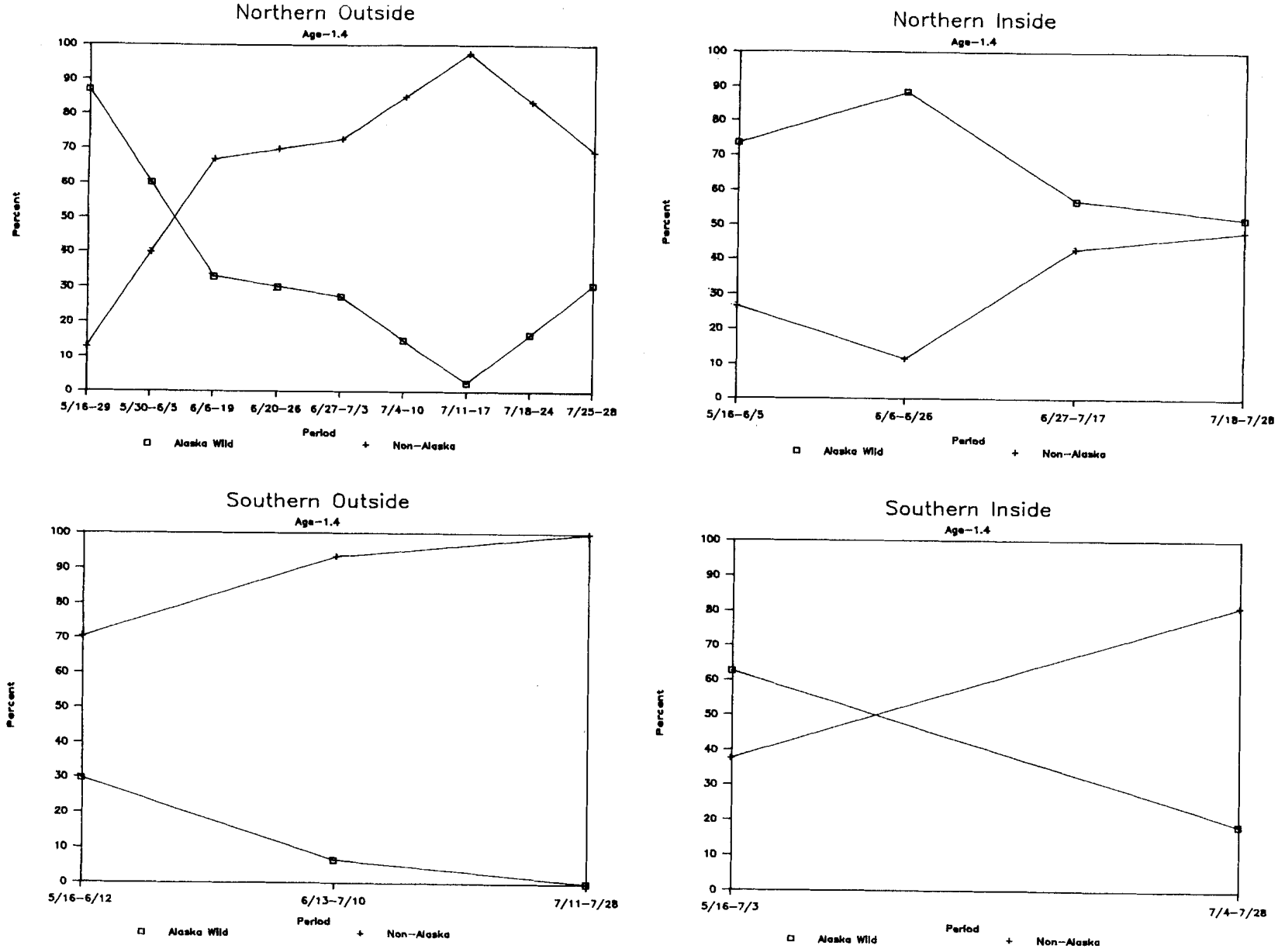


Figure 19. Percent of Alaska, British Columbia, and Washington-Oregon age-1.4 chinook salmon harvested by time and area in the Southeast Alaska summer troll fishery, 1982.

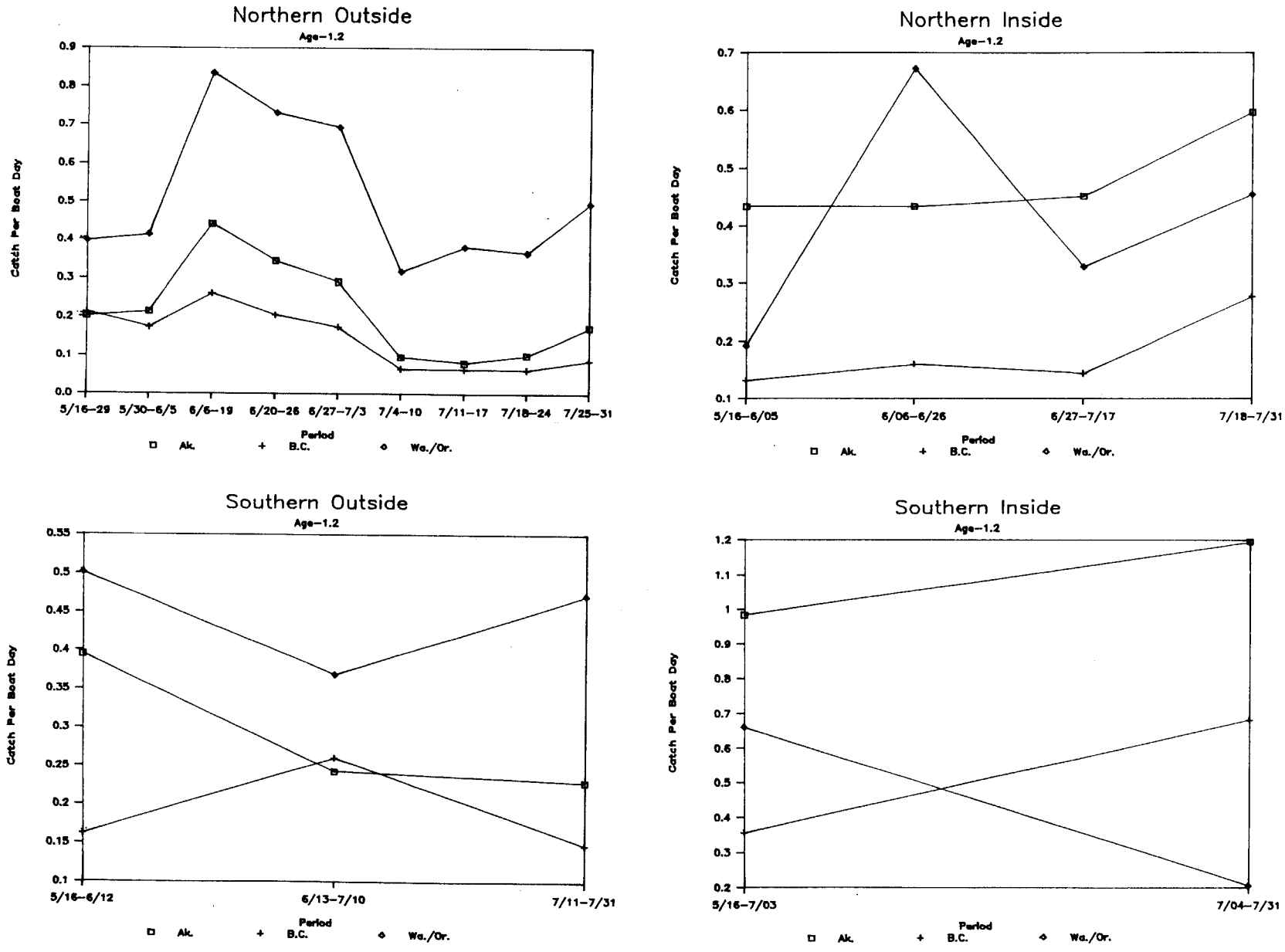


Figure 20. Catch per boat day by area and period of age-1.2 Alaska, British Columbia, and Washington-Oregon chinook salmon harvested in the Southeast Alaska summer troll fishery, 1982.

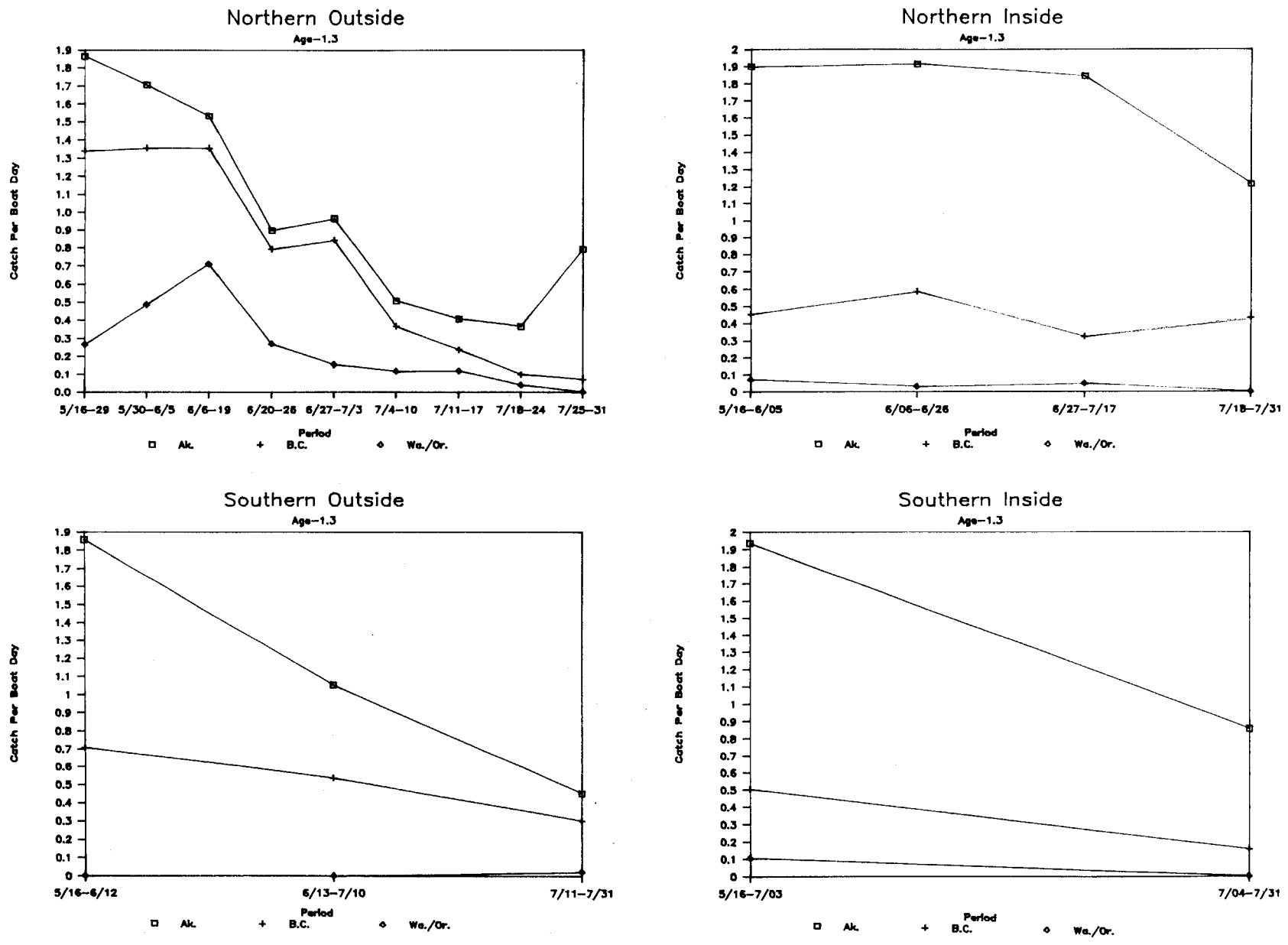


Figure 21. Catch per boat day by area and period of age-1.3 Alaska, British Columbia, and Washington-Oregon chinook salmon harvested in the Southeast Alaska summer troll fishery, 1982.

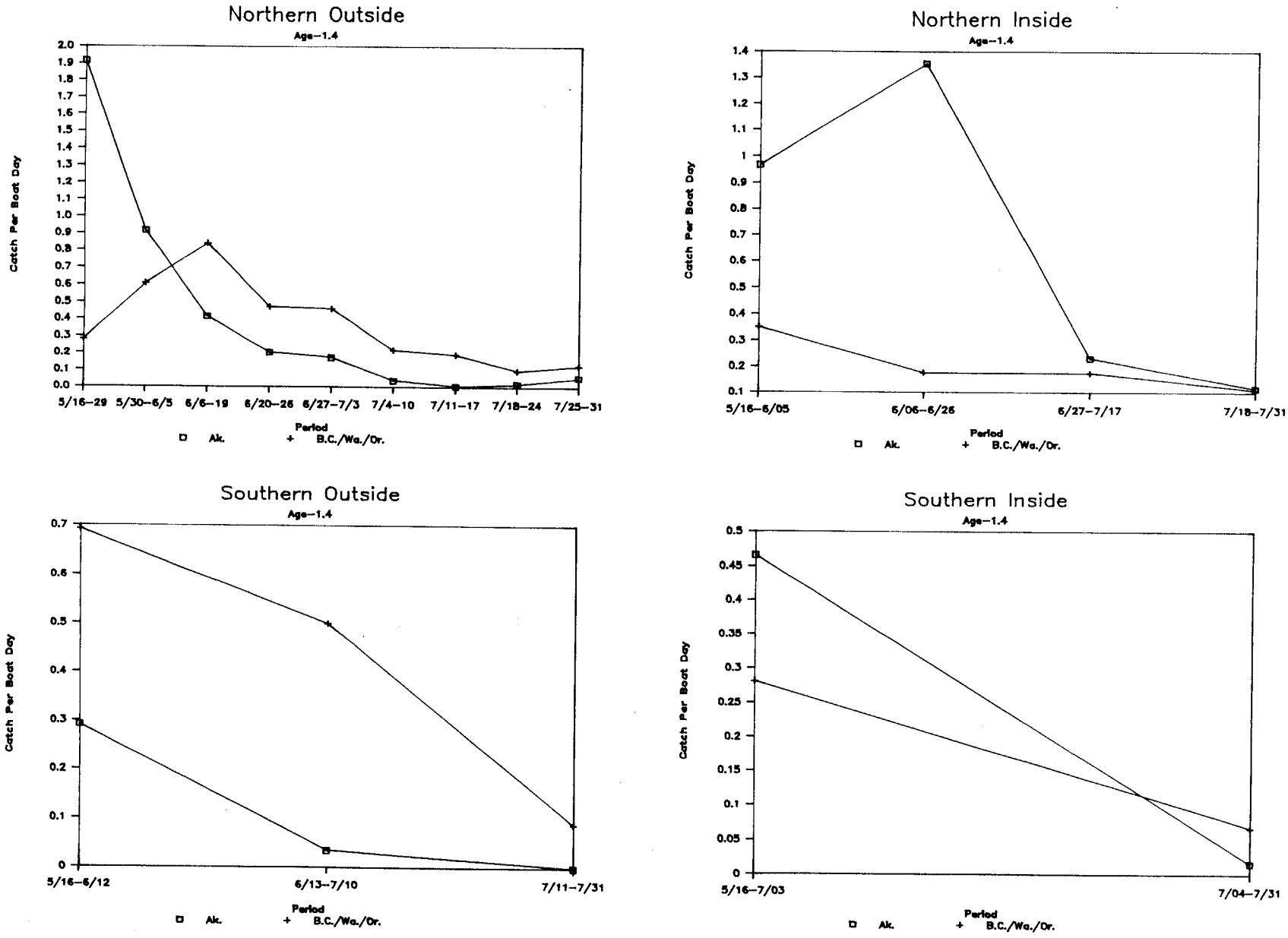


Figure 22. Catch per boat day by area and period of age-1.4 Alaska, British Columbia, and Washington-Oregon chinook salmon harvested in the Southeast Alaska summer troll fishery, 1982.

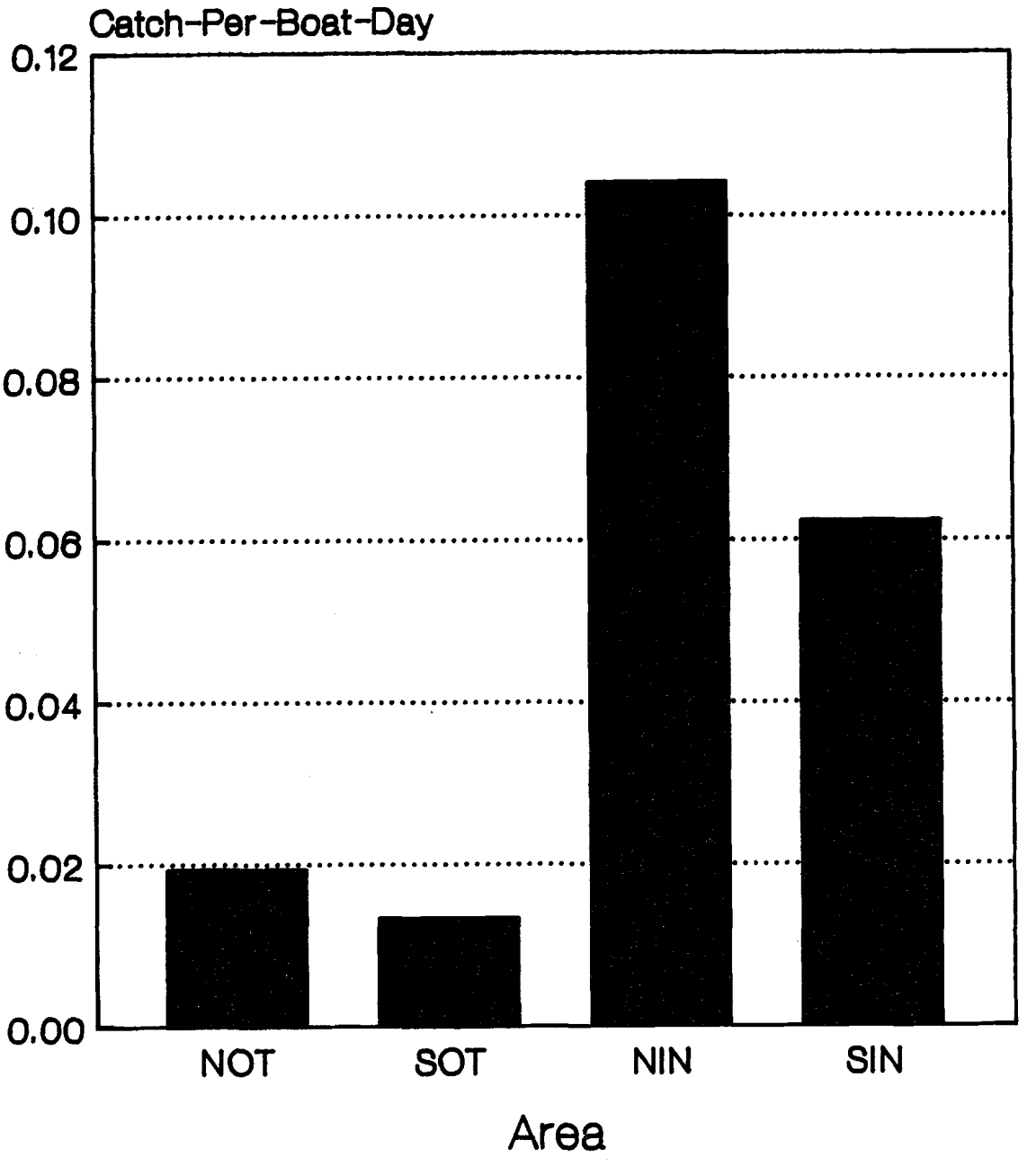


Figure 23. Catch per boat day by area of Alaskan hatchery chinook salmon in the Southeast Alaska summer troll fishery, 1982.

APPENDICES

Appendix A.1. Contribution of chinook salmon from Alaska hatcheries to the 1982 Southeast Alaska troll, seine, and gill net fisheries based on coded microwire tag data. Standard errors are in parenthesis.

Hatchery	Tag Code	Brood Year	1982 Age	Estimated Gill Net Catch	Estimated Purse Seine Catch	Estimated Winter Troll Catch	Estimated Summer Troll Catch	Total Catch
Crystal Lake	041616	1976	0.5			12 (7)	58 (12)	70 (13)
	041835	1977	0.4	8 (7)			17 (6)	25 (9)
	041836	1977	0.4			1 (1)	24 (5)	25 (5)
	041837	1977	0.4				10 (4)	10 (4)
	042043	1979	1.1	16 (9)	17 (7)			33 (11)
Crystal Lake Hatchery Total				24 (11)	17 (7)	13 (7)	109 (15)	163 (20)
Deer Mountain	041746	1977	1.3			2 (2)	21 (9)	23 (9)
	041747	1977	1.3		3 (2)	3 (2)	14 (6)	20 (6)
	041932	1978	1.2	3 (3)			81 (10)	84 (10)
	041938	1978	1.2		2 (0)		142 (14)	144 (14)
	041939	1978	1.2	2 (1)	3 (2)		146 (14)	151 (14)
	041940	1978	1.2	12 (7)	3 (1)		135 (14)	150 (16)
	041917	1979	1.1		1 (0)			1 (0)
	041945	1979	1.1		3 (2)			3 (2)
Deer Mountain Hatchery Total				17 (8)	15 (4)	5 (3)	539 (28)	576 ( )
Little Port Walter	031605	1976	0.5				2 (2)	2 (2)
	031611	1976	1.4				3 (2)	3 (2)
	031613	1976	1.4		3 (2)	3 (2)	11 (5)	17 (5)
	031614	1976	1.4	8 (7)			7 (2)	15 (7)
	031615	1976	1.4				3 (2)	3 (2)
	031616	1976	1.4				1 (1)	1 (1)
	031617	1976	1.4				5 (3)	5 (3)
	031609	1977	0.4				3 (2)	3 (2)
	031621	1977	0.4				1 (1)	1 (1)
	031622	1977	0.4				2 (2)	2 (2)
	031623	1977	0.4				6 (3)	6 (3)
	031631	1977	1.3				14 (5)	14 (5)
	031632	1977	1.3				25 (5)	25 (5)
	031634	1977	1.3				8 (2)	8 (2)
	031635	1977	1.3			3 (2)	7 (2)	10 (3)
	031636	1977	1.3				6 (3)	6 (3)
	031638	1978	0.3				2 (2)	2 (2)
	031658	1978	0.3				4 (2)	4 (2)
	031703	1978	1.2	2 (2)	3 (2)		19 (4)	24 (5)
	031704	1978	1.2		3 (2)		36 (6)	39 (7)
	031705	1978	1.2				2 (2)	2 (2)
	031706	1978	1.2		7 (2)		48 (7)	55 (7)
	031707	1978	1.2	4 (3)			5 (2)	9 (4)
	031708	1978	1.2				2 (2)	2 (2)
	031709	1978	1.2				20 (5)	20 (5)
	031710	1978	1.2				18 (5)	18 (5)
	031711	1978	1.2	1 (0)	1 (0)		10 (3)	12 ( )
	031712	1978	1.2				3 (2)	3 (2)
	031713	1978	1.2				6 (2)	6 (2)
	031715	1978	1.2				4 (1)	4 (1)
	031716	1979	1.1	2 (2)	64 (10)		2 (1)	68 (10)
	031717	1979	1.1		31 (9)			31 (9)
Little Port Walter Total				17 (8)	112 (14)	6 (3)	285 (18)	420 (24)
Snettisham	041930	1977	1.3				2 (1)	2 (1)
	042049	1979	1.1		7 (4)			7 (4)
Snettisham Hatchery Total				0 (0)	7 (4)	0 (0)	2 (1)	9 (4)
Alaska Hatchery Total				58 (16)	151 (17)	24 (8)	935 (37)	1,168 (32)
Percent				5.0	12.9	2.1	80.1	100.0

Appendix A.2. Alaska hatchery contribution of chinook salmon by tag code and area to the winter troll fishery, 8 March to 14 April 1982.

		Area				
Age	Tag Code	Northern Outside	Southern Outside	Northern Inside	Southern Inside	Total
1.3	031635	3				3
	041746		2			2
	041747	3				3
1.4	031613	3				3
0.4	041836			1		1
0.5	041616	6	6			12
Total		15	8	1	0	24
Percent		62.5	33.3	4.2	0.0	100.0

Appendix A.3. Alaska hatchery contribution of chinook salmon by tag code, age, and area to the summer troll fishery, 1982.

Age	Tag Code	Area				Total
		Northern Outside	Southern Outside	Northern Inside	Southern Inside	
1.1	03-17-16			2		2
	Total	0	0	2	0	2
	Percent	0.0	0.0	100.0	0.0	100.0
1.2	03-17-03	2		17		19
	03-17-04	17		19		36
	03-17-05			2		2
	03-17-06	14		34		48
	03-17-07	2		3		5
	03-17-08			2		2
	03-17-09	9		9	2	20
	03-17-10	6		12		18
	03-17-11			10		10
	03-17-12			3		3
	03-17-13			6		6
	03-17-15			2	2	4
	04-19-32	24	6	15	36	81
	04-19-38	61	12	11	58	142
	04-19-39	38	19	29	60	146
	04-19-40	40	12	20	63	135
	Total	213	49	194	221	677
	Percent	31.5	7.2	28.7	32.6	100.0
1.3	03-16-31	6		8		14
	03-16-32	7		18		25
	03-16-34	7		1		8
	03-16-35	7				7
	03-16-36	6				6
	04-17-46	5	12		4	21
	04-17-47	2	5	2	5	14
	04-19-30			2		2
	Total	40	17	31	9	97
	Percent	41.2	17.5	32.0	9.3	100.0
1.4	03-16-11			3		3
	03-16-13			11		11
	03-16-14	2		3	2	7
	03-16-15			3		3
	03-16-16			1		1
	03-16-17			5		5
	Total	2	0	26	2	30
	Percent	6.7	0.0	86.7	6.7	100.0
Age 1.	Total	255	66	253	232	806
	Percent	31.6	8.2	31.4	28.8	100.0
0.3	03-16-38	2				2
	03-16-58	2		2		4
	Total	4	0	2	0	6
	Percent	66.7	0.0	33.3	0.0	100.0
0.4	03-16-09				3	3
	03-16-21			1		1
	03-16-22		2			2
	03-16-23	3		3		6
	04-18-35	2	5	10		17
	04-18-36	2		22		24
	04-18-37			10		10
	Total	7	7	46	3	63
	Percent	11.1	11.1	73.0	4.8	100.0
0.5	03-16-05			2		2
	04-16-16	5		49	4	58
	Total	5	0	51	4	60
	Percent	8.3	0.0	85.0	6.7	100.0
Age 0.	Total	16	7	99	7	129
	Percent	12.4	5.4	76.7	5.4	100.0
Total		271	73	352	239	935
Percent		29.0	7.8	37.6	25.6	100.0

Appendix A.4. Estimated number of chinook salmon from Southeast Alaska hatcheries that were harvested in the District 104 seine and District 101 and 111 gill net fisheries, 1982.

		Seine	Gill Net	
Tag code	Age	District 104	District 101	District 111
031716	1.1	4		
042043	1.1			4
031703	1.2			2
031707	1.2			4
041932	1.2		3	
041939	1.2	3	2	
041940	1.2		6	
Total		7	11	10

Appendix A.5. Recoveries of coded microwire tagged Southeast Alaska origin chinook salmon in catches of foreign commercial and research vessels operating in the North Pacific Ocean from 1980 to 1986. Source: Dahlberg 1981 and 1982, Wertheimer and Dahlberg 1983 and 1984, Dahlberg and Fowler 1985, and Dahlberg et. al. 1986 and 1987.

Recovery Year	Origin	Age	Number Recovered
1980	None		
1981	None		
1983	Deer Mountain Hatchery	1.2	1
1984	Stikine River (Wild)	1.3	1
	Little Port Walter Hatchery	1.3	1
	Deer Mountain Hatchery	1.3	1
	Crystal Lake Hatchery	1.3	1
	Little Port Walter Hatchery	1.2	2
	Deer Mountain Hatchery	1.2	5
	Crystal Lake Hatchery	1.2	2
	Crystal Lake Hatchery	1.1	3
	Hidden Falls Hatchery	1.1	1
1985	Deer Mountain Hatchery	1.3	2
	Crystal Lake Hatchery	1.2	1
	Deer Mountain Hatchery	1.2	1
	Whitman Lake Hatchery	1.2	5
	Whitman Lake Hatchery	1.1	5
1986[a]	Little Port Walter Hatchery	1.3	1
	Crystal Lake Hatchery	1.3	1
	Whitman Lake Hatchery	1.2	1

[a] Preliminary

Appendix Table B.1. Age compositions of chinook salmon from escapements to Southeast Alaska rivers and hatcheries, 1982.

Region/ River	Sampling Location		Age Class 0.2	0.3	0.4	0.5	1.0	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	Other	Total
Alaska Wild [a]																		
Alsek	Klukshu	Sample Size			1				18	46	44							109
		Percent			0.9				16.5	42.2	40.4							100.0
		Number Fish			34				611	1,562	1,494							3,702
Taku	Nakina	Sample Size			1			865	248	353	811	23	3	2	5	1		2,312
		Percent			0.0			37.4	10.7	15.3	35.1	1.0	0.1	0.1	0.2	0.0		100.0
		Number Fish			2			2,106	604	859	1,975	56	7	5	12	2		5,629
	Nahlin	Sample Size			2		1	4	24	143								174
		Percent			1.1		0.6	2.3	13.8	82.2								100.0
		Number Fish			32		16	64	382	2,276								2,769
Stikine	L. Tahltan	Sample Size						3	11	63	292	4						373
		Percent						0.8	2.9	16.9	78.3	1.1						100.0
		Number Fish						86	315	1,804	8,360	115						10,679
	Tahltan	Sample Size						2	4	28	143	13						190
		Percent						1.1	2.1	14.7	75.3	6.8						100.0
		Number Fish						67	134	940	4,802	437						6,380
	Andrews	Sample Size		1	2			5	21	44	248	8						329
		Percent		0.3	0.6			1.5	6.4	13.4	75.4	2.4						100.0
		Number Fish		3	6			16	67	141	794	26						1,053
Chilkat [b]	Chilkat Inlet	Sample Size			1				7	18	125	15	1			3		170
		Percent			0.6				4.1	10.6	73.5	8.8	0.6			1.8		100.0
		Number Fish			6				41	106	735	88	6			18		1,000
Keta	Keta	Sample Size			1				1	8	13							23
		Percent			4.3				4.3	34.8	56.5							100.0
		Number Fish			52				52	419	682							1,206
Unuk	Cripple Creek	Sample Size						4	3	7	18							32
		Percent						12.5	9.4	21.9	56.3							100.0
		Number Fish						270	203	473	1,216							2,162
Alaska Wild Total		Percent		0.0	0.4		0.0	7.5	7.0	24.8	58.0	2.1	0.0	0.0	0.0	0.1		100.0
		Number Fish		3	133		16	2,609	2,410	8,580	20,057	721	13	5	12	20		34,580
		Std. Error		3	67		16	159	231	389	425	133	7	3	5	10		
Alaska Hatchery																		
Ketchikan Creek (Deer Mtn. Hatchery)		Sample Size						23	211	52								286
		Percent						8.0	73.8	18.2								100.0
Crystal Creek (Crystal Lake Hatchery)		Sample Size	4	2		85		60	1	47								199
		Percent	2.0	1.0		42.7		30.2	0.5	23.6								100.0
Sashin Creek (Little Port Walter)		Sample Size		2	13				28	44	54							141
		Percent		3.5	9.0				19.4	30.6	37.5							100.0

[a] Alaskan age composition data from Van Alen and Wood (1983), Tables 26 and 27.
[b] Samples obtained from chinook salmon caught in the upper Chilkat Inlet during the Haines Salmon Derby, 29 - 31 May and 5 - 6 June, 1982.

Appendix B.2. Age compositions of chinook salmon from in-river fisheries and escapements to select British Columbia and Washington-Oregon rivers, 1982.

Region/ River	Sampling Location		Age Class 0.1	0.2	0.3	0.4	1.1	1.2	1.3	1.4	1.5	2.2	2.3	Other[a]	Total
British Columbia															
Nass	Greenville	Sample Size						28	54	13					95
		Percent						29.5	56.8	13.7					100.0
		Number Fish						5,564	10,731	2,583					18,878
Skeena	Skeena Testfish	Sample Size				1		25	60	33	2				121
		Percent				0.8		20.7	49.6	27.3	1.7				100.0
		Number Fish				352		8,807	21,137	11,626	705				42,627
Bella Coola	Bella Coola	Sample Size		4	35	17	1	11	36	22					126
		Percent		3.2	27.8	13.5	0.8	8.7	28.6	17.5					100.0
		Number Fish		471	4,125	2,004	118	1,296	4,243	2,593					14,850
Fraser	Albion Testfish	Sample Size	2	125	262	11		133	208	18		5	10		774
		Percent	0.3	16.1	33.9	1.4		17.2	26.9	2.3		0.6	1.3		100.0
		Number Fish	322	20,138	42,208	1,772		21,426	33,509	2,900		806	1,611		124,692
British Columbia Total		Percent	0.2	10.3	23.0	2.1	0.1	18.5	34.6	9.8	0.4	0.4	0.8		100.0
		Number Fish	322	20,609	46,333	4,128	118	37,094	69,620	19,702	705	806	1,611		201,047
		Std. Error	228	1,667	2,204	782	118	2,505	3,005	2,040	496	359	506		
Washington-Oregon[b]															
Washington Inland[c]		Sample Size		228	320	68		91	46					15	761
		Percent		30	42	9		12	6					2	101
		Number Fish		136,491	191,088	40,947		54,597	27,298					9,099	454,971
Washington Coastal[d]		Sample Size		260	474	673		15	15					92	1,529
		Percent		17	31	44		1	1					6	100
		Number Fish		11,058	20,164	28,620		650	650					3,903	65,046
Columbia R. Springs	Woody Isl./ Corbett Testfish	Sample Size						272	227	6					505
		Percent						53.9	45.0	1.2					100.0
		Number Fish						73,413	61,268	1,619					136,300
Columbia R. Falls[e]		Sample Size		101	125	37		7	3					64	338
		Percent		30	37	11		2	1					19	100
		Number Fish		87,480	107,892	32,076		5,832	2,916					55,404	291,600
Oregon Coastal[f]		Sample Size		43	126	108		7	4	18				51	361
		Percent		12	35	30		2	1	5				14	99
		Number Fish		22,173	64,671	55,432		3,695	1,848	9,239				25,868	184,773
Washington-Oregon Total		Percent		22.7	33.9	13.9		12.2	8.3	1.0				8.3	100.0
		Number Fish		257,202	383,815	157,076		138,188	93,980	10,858				94,274	1,132,690
		Std. Error		10,981	12,138	8,222		6,690	5,286	2,222				7,466	

[a] Includes all fish not aged 0.2, 0.3, 0.4, 1.2, 1.3, and 1.4.
[b] Washington - Oregon age composition data from: Knudsen, et. al. (1983); Myers and Rogers (1983); and Pers. comm., K.W. Myers, University of Washington, Fisheries Research Institute.
[c] Samples from: Nooksack/Samish, Skagit, Stillaguamish/Snohomish, Duwamish, Hood Canal, Puyallup, and Deschutes.
[d] Samples from: Quileute, Quinault, Queets, Humptulips, and Chehalis.
[e] Samples from: the lower river commercial catch in 1981.
[f] Samples from: Siuslaw, Nestucca, Tillamook, Yaquina, Coos, and Coquille.

Appendix B.3. Age composition of chinook salmon harvested in the Southeast Alaska winter troll fishery, 8 March to 14 April 1982.

		Brood Year and Age Class												
		1979	1978		1977			1976			1975			
Area		0.2	0.3	1.2	0.4	1.3	2.2	0.5	1.4	2.3	0.6	1.5	2.4	Total
Northern Outside	Sample Size	4	305	10	100	197	1	5	79	4		8		713
	Percent	0.6	42.8	1.4	14.0	27.6	0.1	0.7	11.1	0.6		1.1		100.0
	SE of %	0.3	1.9	0.4	1.3	1.7		0.3	1.2	0.3		0.4		
	Number Fish	18	1,400	46	459	904	5	23	363	18		37		3,272
Southern Outside	Sample Size	5	124	11	17	51		1	8			1		218
	Percent	2.3	56.9	5.0	7.8	23.4		0.5	3.7			0.5		100.0
	SE of %	1.0	3.4	1.5	1.8	2.9			1.3					
	Number Fish	28	702	62	96	289		6	45			6		1,235
Northern Inside	Sample Size	8	276	18	81	123		8	65		1	2	1	583
	Percent	1.4	47.3	3.1	13.9	21.1		1.4	11.1		0.2	0.3	0.2	100.0
	SE of %	0.5	2.1	0.7	1.4	1.7		0.5	1.3			0.2		
	Number Fish	11	394	26	116	176		11	93		1	3	1	832
Southern Inside	Sample Size		47	14	7	55		1	9	1				134
	Percent		35.1	10.4	5.2	41.0		0.7	6.7	0.7				100.0
	SE of %		4.1	2.7	1.9	4.3			2.2					
	Number Fish		403	120	60	472		9	77	9				1,149
Total	Sample Size	17	752	53	205	426	1	15	161	5	1	11	1	1,648
	Percent	0.9	44.7	3.9	11.3	28.4	0.1	0.7	8.9	0.4	0.0	0.7	0.0	100.0
	SE of %	1.2	6.0	3.2	3.3	5.7		0.6	3.1	0.3		0.5		
	Number Fish	58	2,899	254	731	1,840	5	49	578	27	1	45	1	6,488

Appendix B.4. Age composition of chinook salmon harvested by Southeast Alaska purse seine fishermen in District 104 and gill net fishermen in Districts 101 and 111, 1982.

	Brood Year and Age Class													
	1979		1978			1977			1976			1975		
Fishery	0.2	1.1	0.3	1.2	2.1	0.4	1.3	2.2	0.5	1.4	2.3	1.5	2.4	Total
Seine Dist. 104														
Sample number	282	1	347	42	1	129	81	8	8	27	2	1		929
Percent	30.4	0.1	37.4	4.5	0.1	13.9	8.7	0.9	0.9	2.9	0.2	0.1		100.0
SE of %	1.5		1.6	0.7		1.1	0.9	0.3	0.3	0.6	0.2			
Number Fish	6,518	24	8,022	971	24	2,983	1,872	185	185	625	45	24		21,478
Gill Net Districts 101 and 111														
Sample number	32	8	20	193	1	3	97	2		68		2	1	427
Percent	7.5	1.9	4.7	45.2	0.2	0.7	22.7	0.5		15.9		0.5	0.2	100.0
SE of %	1.3	0.7	1.0	2.4		0.4	2.0	0.3		1.8		0.3		
Number Fish	569	142	356	3,437	18	53	1,727	36		1,211		36	18	16,234

Appendix C.1. Test classification matrices for linear discriminant function analysis of Alaska hatchery versus Alaska wild versus non-Alaskan age-1.2, 1.3, and 1.4 chinook salmon, 1982.

Age-1.2 Alaska Hatchery/Alaska Wild/British Columbia/Washington-Oregon

Actual Group of Origin	Sample Size	Classified Group of Origin (Variables = 65,85,70,61,15,25,62,80,106) Alaska Hatchery	Alaska Wild	British Columbia	Washington-Oregon
Alaska Hatchery	62	0.806	0.048	0.032	0.113
Alaska Wild	121	0.041	0.835	0.116	0.008
British Columbia	187	0.048	0.171	0.749	0.032
Washington-Oregon	134	0.164	0.045	0.172	0.619

Average classification accuracy = 0.752

Age-1.3 Alaska Hatchery/Alaska Wild/British Columbia/Washington-Oregon

Actual Group of Origin	Sample Size	Classified Group of Origin (Variables = 65,70,89,18,28,11,105,73) Alaska Hatchery	Alaska Wild	British Columbia	Washington-Oregon
Alaska Hatchery	66	0.742	0.121	0.045	0.091
Alaska Wild	163	0.098	0.816	0.086	0.000
British Columbia	164	0.037	0.122	0.829	0.012
Washington-Oregon	166	0.133	0.012	0.048	0.807

Average classification accuracy = 0.799

Age-1.4 Alaska Hatchery/Alaska Wild/British Columbia-Washington-Oregon

Actual Group of Origin	Sample Size	Classified Group of Origin (Variables = 18,105,70,66,65) Alaska Hatchery	Alaska Wild	BC-WA-OR
Alaska Hatchery	24	0.917	0.083	0.000
Alaska Wild	190	0.005	0.874	0.121
BC-WA-OR	122	0.074	0.156	0.770

Average classification accuracy = 0.854

Appendix C.2. Stock composition estimates and standard errors calculated from scale patterns in a 4-way Alaska hatchery, Alaska wild, British Columbia, Washington-Oregon model for age-1.2 chinook salmon harvested in Southeast Alaska troll, seine, and gill net fisheries, 1982.

Fishery/ Area	Date	Sample Size	Stock Composition Estimates and Standard Error (in Parenthesis) Alaska Hatchery	Alaska Wild	British Columbia	Washington-Oregon
Troll						
All Areas Combined	3/08-4/15	35	.000	.284(.10272)	.262(.12654)	.454(.11673)
Northern Outside	5/15-5/29	100	.008(.05367)	.260(.06530)	.232(.08199)	.500(.09087)
	6/06-6/19	98	.064(.06037)	.265(.06469)	.168(.07854)	.504(.09277)
	7/27-7/03	97	.000	.251(.06086)	.149(.07713)	.599(.07727)
	7/11-7/17	100	.008(.06548)	.188(.05757)	.051(.07921)	.753(.10598)
	7/25-7/28	70	.000	.229(.06888)	.116(.08737)	.655(.08989)
Southern Outside	5/15-6/12	95	.000	.373(.06656)	.153(.07522)	.474(.07327)
	6/13-7/10	81	.135(.06579)	.218(.07108)	.333(.08856)	.314(.08687)
	7/11-7/28	94	.015(.05651)	.276(.06726)	.193(.08250)	.517(.09437)
Northern Inside	5/15-6/05	34	.097(.08899)	.517(.12087)	.132(.11540)	.254(.11727)
	6/06-6/26	58	.173(.08419)	.293(.08341)	.131(.09094)	.403(.11056)
	6/27-7/17	98	.094(.05638)	.419(.07202)	.172(.07469)	.315(.07774)
	7/18-7/28	94	.046(.05206)	.436(.07459)	.198(.07854)	.319(.07847)
Southern Inside	5/15-7/03	100	.046(.04888)	.525(.07458)	.163(.07425)	.267(.07086)
	7/04-7/28	95	.000	.574(.07261)	.328(.07942)	.099(.04552)
Seine						
District 104	6/27-10/6	25	.000	.055(.08544)	.183(.14960)	.762(.14482)
Gill Net						
Districts 101, 111	6/6-10/23	152	.000	.700(.06059)	.252(.06520)	.049(.02994)

Appendix C.3. Stock composition estimates and standard errors calculated from scale patterns in a 4-way Alaska hatchery, Alaska wild, British Columbia, Washington-Oregon model for age-1.3 chinook salmon harvested in Southeast Alaska troll, seine, and gill net fisheries, 1982.

Fishery/ Area	Date	Sample Size	Stock Composition Estimates and Standard Error (in Parenthesis) Alaska Hatchery	Alaska Wild	British Columbia	Washington-Oregon
Troll						
Northern Outside	3/08-4/15	96	.104(.05386)	.189(.06923)	.677(.07194)	.030(.02841)
	5/15-5/29	97	.092(.05637)	.415(.07537)	.420(.06904)	.073(.03506)
	6/06-6/19	75	.254(.07912)	.208(.07552)	.424(.07629)	.114(.05177)
	7/27-7/03	135	.085(.04727)	.359(.06405)	.481(.06072)	.075(.03035)
	7/11-7/17	66	.006(.05920)	.530(.08970)	.281(.07665)	.183(.05730)
	7/25-7/28	60	.000	.918(.05476)	.082(.05476)	.000
Southern Outside	3/08-4/15	44	.068(.07510)	.359(.10679)	.503(.10224)	.069(.04997)
	5/15-6/12	100	.000	.724(.05589)	.276(.05589)	.000
	6/13-7/10	100	.047(.03944)	.539(.07383)	.413(.06772)	.000
	7/11-7/28	75	.020(.05166)	.443(.08673)	.515(.08070)	.023(.02511)
Northern Inside	3/08-4/15	94	.109(.05480)	.153(.06763)	.694(.07235)	.043(.03188)
	5/15-6/05	97	.000	.782(.06563)	.187(.06125)	.029(.02802)
	6/06-6/26	77	.051(.06239)	.705(.08673)	.237(.07072)	.007(.01826)
	6/27-7/17	119	.035(.05201)	.736(.07200)	.204(.05702)	.024(.01946)
	7/18-7/28	97	.000	.737(.05614)	.263(.05614)	.000
Southern Inside	3/08-4/15	50	.097(.07758)	.364(.09902)	.408(.09295)	.132(.06041)
	5/15-7/03	89	.055(.06082)	.750(.08084)	.176(.06264)	.019(.02145)
	7/04-7/28	72	.020(.04763)	.862(.08087)	.118(.06646)	.000
Seine						
District 104	6/27-10/6	61	.000	.496(.08461)	.379(.08239)	.124(.04972)
Gill Net						
Districts 101, 111	6/6-10/23	16	.000	.782(.12722)	.218(.12722)	.000

Appendix C.4. Stock composition estimates and standard errors calculated from scale patterns in a 3-way Alaska hatchery, Alaska wild, British Columbia, Washington-Oregon model for age-1.4 chinook salmon harvested in Southeast Alaska troll, seine, and gill net fisheries, 1982.

Fishery/ Area	Date	Sample Size	Stock Composition Estimates and Standard Error (in Parenthesis) Alaska Hatchery	Alaska Wild	British Columbia-Washington-Oregon
Troll					
Northern Outside	5/15-5/29	99	.046(.02538)	.899(.06336)	.056(.06343)
	6/06-6/19	92	.288(.05785)	.342(.07434)	.370(.07452)
	7/27-7/03	43	.279(.08519)	.103(.09157)	.618(.11276)
	7/11-7/17	36	.404(.09596)	.000	.596(.09596)
	7/25-7/28	16	.086(.09739)	.314(.17001)	.600(.18761)
Southern Outside	5/15-6/12	82	.000	.296(.07899)	.704(.07899)
	6/13-7/10	46	.018(.05608)	.027(.08943)	.956(.10822)
	7/11-7/28	11	.000	.000	1.000
Outside Areas Combined	3/08-4/15	82	.000	.642(.07699)	.357(.07699)
Northern Inside	5/15-6/05	74	.033(.03135)	.689(.08143)	.278(.08523)
	6/06-6/26	65	.069(.03775)	.797(.08114)	.135(.08036)
	6/27-7/17	44	.038(.04541)	.546(.10751)	.416(.11424)
	7/18-7/28	17	.025(.06727)	.523(.17051)	.453(.18204)
Southern Inside	5/15-7/03	51	.025(.04031)	.523(.10093)	.453(.10818)
	7/04-7/28	7	.000	.187(.23445)	.813(.23445)
Inside Areas Combined	3/08-4/15	68	.000	.438(.08680)	.562(.08680)
Seine					
District 104	6/27-10/6	18	.058(.08947)	.176(.15089)	.766(.17391)
Gill Net					
Districts 101, 111	6/6-10/23	54	.000	.930(.07479)	.070(.07479)

Apendix C.5. Estimated contribution of Alaska hatchery, Alaska wild, British Columbia and Washington-Oregon age-1.2, 1.3, and 1.4 chinook salmon to the Southeast Alaska winter troll fishery, 8 March to 14 April, 1982, based on analysis of scale patterns.

Area	Stock of Origin	Age-1.2		Age-1.3		Age-1.4		Total	
		Proportion	Number	Proportion	Number	Proportion	Number	Proportion	Number
Northern Outside	Alaska Hatchery	0.000	0	0.104	94	0.000	0	0.072	94
	Alaska Wild	0.284	13	0.189	171	0.643	233	0.318	417
	Non-Alaska					0.357	130	0.610	801
	British Columbia	0.262	12	0.677	611				
	Washington-Oregon	0.454	21	0.030	27				
	Total		46		903		363		1,312
Southern Outside	Alaska Hatchery	0.000	0	0.068	20	0.000	0	0.050	20
	Alaska Wild	0.284	18	0.359	104	0.643	29	0.380	151
	Non-Alaska					0.357	16	0.571	225
	British Columbia	0.262	16	0.503	145				
	Washington-Oregon	0.454	28	0.069	20				
	Total		62		289		45		396
Northern Inside	Alaska Hatchery	0.000	0	0.109	19	0.000	0	0.065	19
	Alaska Wild	0.284	7	0.153	27	0.438	41	0.255	75
	Non-Alaska					0.562	52	0.680	201
	British Columbia	0.262	7	0.694	122				
	Washington-Oregon	0.454	12	0.043	8				
	Total		26		176		93		295
Southern Inside	Alaska Hatchery	0.000	0	0.097	46	0.000	0	0.068	46
	Alaska Wild	0.284	34	0.364	172	0.438	34	0.358	240
	Non-Alaska					0.562	43	0.574	383
	British Columbia	0.262	31	0.408	192				
	Washington-Oregon	0.454	55	0.132	62				
	Total		120		472		77		669
Total	Alaska Hatchery	0.000	0	0.097	179	0.000	0	0.067	179
	Alaska Wild	0.283	72	0.257	474	0.583	337	0.330	883
	Non-Alaska					0.417	241	0.603	1,610
	British Columbia	0.261	66	0.582	1,070				
	Washington-Oregon	0.455	116	0.064	117				
	Total		254		1,840		578		2,672

Appendix C.6. Estimated contribution of Alaska hatchery, Alaska wild, British Columbia and Washington-Oregon age-1.2, 1.3, and 1.4 chinook salmon to the 1982 Southeast Alaska summer troll fishery, Northern Outside area, based analysis of scale patterns.

Date	Stock of Origin	Age-1.2		Age-1.3		Age-1.4		Total	
		Proportion	Number	Proportion	Number	Proportion	Number	Proportion	Number
5/15-5/29	Alaska Hatchery	0.008	10	0.092	477	0.046	150	0.066	637
	Alaska Wild	0.260	315	0.415	2,150	0.899	2,946	0.560	5,411
	Non-Alaska					0.056	184	0.375	3,625
	British Columbia	0.232	281	0.420	2,176				
	Washington-Oregon	0.500	606	0.073	378				
	Total		1,212		5,181		3,280		9,673
5/30-6/05[a]	Alaska Hatchery	0.036	36	0.173	772	0.167	320	0.153	1,128
	Alaska Wild	0.263	264	0.312	1,391	0.621	1,186	0.385	2,841
	Non-Alaska					0.213	408	0.463	3,417
	British Columbia	0.200	201	0.422	1,885				
	Washington-Oregon	0.502	506	0.094	417				
	Total		1,007		4,465		1,914		7,386
6/06-6/19	Alaska Hatchery	0.064	131	0.254	1,221	0.288	482	0.215	1,834
	Alaska Wild	0.265	544	0.208	1,000	0.342	572	0.248	2,116
	Non-Alaska					0.370	618	0.537	4,583
	British Columbia	0.168	345	0.424	2,037				
	Washington-Oregon	0.504	1,035	0.114	548				
	Total		2,055		4,806		1,672		8,533
6/20-6/26[a]	Alaska Hatchery	0.032	76	0.170	618	0.284	355	0.144	1,049
	Alaska Wild	0.258	613	0.284	1,033	0.223	279	0.265	1,925
	Non-Alaska					0.494	618	0.591	4,299
	British Columbia	0.159	377	0.453	1,649				
	Washington-Oregon	0.552	1,311	0.095	344				
	Total		2,377		3,644		1,252		7,273
6/27-7/03	Alaska Hatchery	0.000	0	0.085	247	0.279	261	0.091	508
	Alaska Wild	0.251	430	0.359	1,044	0.103	96	0.283	1,570
	Non-Alaska					0.618	579	0.626	3,477
	British Columbia	0.149	255	0.481	1,398				
	Washington-Oregon	0.599	1,027	0.075	218				
	Total		1,712		2,907		936		5,555
7/04-7/10[a]	Alaska Hatchery	0.004	3	0.046	65	0.342	127	0.078	195
	Alaska Wild	0.220	151	0.445	636	0.350	129	0.368	916
	Non-Alaska					0.309	114	0.554	1,380
	British Columbia	0.100	69	0.381	545				
	Washington-Oregon	0.676	467	0.129	185				
	Total		690		1,431		370		2,491
7/11-7/17	Alaska Hatchery	0.008	10	0.006	11	0.404	183	0.059	204
	Alaska Wild	0.188	227	0.530	932	0.596	270	0.418	1,429
	Non-Alaska					0.000	0	0.523	1,787
	British Columbia	0.051	62	0.281	495				
	Washington-Oregon	0.753	908	0.183	322				
	Total		1,207		1,760		453		3,420
7/18-7/24[a]	Alaska Hatchery	0.004	5	0.003	4	0.245	69	0.028	78
	Alaska Wild	0.209	266	0.724	879	0.455	129	0.459	1,274
	Non-Alaska					0.300	85	0.512	1,420
	British Columbia	0.084	106	0.182	221				
	Washington-Oregon	0.704	897	0.092	111				
	Total		1,274		1,215		283		2,772
7/25-7/28	Alaska Hatchery	0.000	0	0.000	0	0.086	32	0.009	32
	Alaska Wild	0.229	341	0.918	1,560	0.314	115	0.567	2,016
	Non-Alaska					0.600	220	0.424	1,505
	British Columbia	0.116	172	0.082	139				
	Washington-Oregon	0.655	974	0.000	0				
	Total		1,487		1,699		367		3,553
Total	Alaska Hatchery	0.021	271	0.126	3,415	0.188	1,979	0.112	5,665
	Alaska Wild	0.242	3,151	0.392	10,625	0.544	5,722	0.385	19,498
	Non-Alaska					0.268	2,826	0.503	25,493
	British Columbia	0.144	1,868	0.389	10,545				
	Washington-Oregon	0.594	7,731	0.093	2,523				
	Total		13,027		27,108		10,527		50,656

[a] The proportions for this period were linearly interpolated from the adjacent periods.

Appendix C.7. Estimated contribution of Alaska hatchery, Alaska wild, British Columbia, and Washington-Oregon age-1.2, 1.3, and 1.4 chinook salmon to the 1982 Southeast Alaska summer troll fishery, Southern Outside area, based on analysis of scale patterns.

Date	Stock of Origin	Age-1.2		Age-1.3		Age-1.4		Total	
		Proportion	Number	Proportion	Number	Proportion	Number	Proportion	Number
5/15-6/12	Alaska Hatchery	0.000	0	0.000	0	0.000	0	0.000	0
	Alaska Wild	0.373	648	0.724	3,049	0.296	478	0.552	4,175
	Non-Alaska					0.704	1,136	0.448	3,387
	British Columbia	0.153	266	0.276	1,162				
	Washington-Oregon	0.474	823	0.000	0				
	Total		1,737		4,211		1,614		7,562
6/13-7/10	Alaska Hatchery	0.135	259	0.047	165	0.018	21	0.067	445
	Alaska Wild	0.218	418	0.539	1,890	0.027	32	0.355	2,340
	Non-Alaska					0.956	1,123	0.578	3,811
	British Columbia	0.333	637	0.413	1,449				
	Washington-Oregon	0.314	602	0.000	0				
	Total		1,916		3,504		1,176		6,596
7/11-7/28	Alaska Hatchery	0.015	21	0.020	26	0.000	0	0.017	47
	Alaska Wild	0.276	385	0.443	570	0.000	0	0.338	955
	Non-Alaska					1.000	146	0.646	1,826
	British Columbia	0.193	269	0.515	662				
	Washington-Oregon	0.517	719	0.023	30				
	Total		1,394		1,288		146		2,828
Total	Alaska Hatchery	0.055	280	0.021	191	0.007	21	0.029	492
	Alaska Wild	0.287	1,451	0.612	5,509	0.174	510	0.440	7,470
	Non-Alaska					0.819	2,405	0.531	9,024
	British Columbia	0.232	1,172	0.364	3,273				
	Washington-Oregon	0.425	2,144	0.003	30				
	Total		5,047		9,003		2,936		16,986

Appendix C.8. Estimated contribution of Alaska hatchery, Alaska wild, British Columbia, and Washington-Oregon age-1.2, 1.3, and 1.4 chinook salmon to the 1982 Southeast Alaska summer troll fishery, Northern Inside area, based on analysis of scale pattens.

Date	Stock of Origin	Age-1.2		Age-1.3		Age-1.4		Total	
		Proportion	Number	Proportion	Number	Proportion	Number	Proportion	Number
5/15-6/05	Alaska Hatchery	0.097	41	0.000	0	0.033	24	0.026	65
	Alaska Wild	0.517	221	0.782	1,068	0.689	511	0.711	1,800
	Non-Alaska					0.278	206	0.263	665
	British Columbia	0.132	56	0.187	255				
	Washington-Oregon	0.254	108	0.029	40				
	Total		426		1,363		741		2,530
6/06-6/26	Alaska Hatchery	0.173	171	0.051	101	0.069	82	0.085	354
	Alaska Wild	0.293	289	0.705	1,391	0.797	950	0.633	2,630
	Non-Alaska					0.135	161	0.282	1,170
	British Columbia	0.131	129	0.237	468				
	Washington-Oregon	0.403	398	0.007	14				
	Total		987		1,974		1,193		4,154
6/27-7/17	Alaska Hatchery	0.094	122	0.035	109	0.038	22	0.051	253
	Alaska Wild	0.419	541	0.736	2,286	0.546	310	0.632	3,137
	Non-Alaska					0.416	237	0.317	1,575
	British Columbia	0.172	223	0.204	633				
	Washington-Oregon	0.315	408	0.024	74				
	Total		1,294		3,102		569		4,965
7/18-7/28	Alaska Hatchery	0.046	52	0.000	0	0.025	5	0.021	57
	Alaska Wild	0.436	494	0.737	1,033	0.523	99	0.597	1,626
	Non-Alaska					0.453	86	0.382	1,039
	British Columbia	0.198	224	0.263	368				
	Washington-Oregon	0.319	361	0.000	0				
	Total		1,131		1,401		190		2,722
Total	Alaska Hatchery	0.101	386	0.027	210	0.049	133	0.051	729
	Alaska Wild	0.403	1,545	0.737	5,778	0.694	1,870	0.640	9,193
	Non-Alaska					0.256	690	0.310	4,449
	British Columbia	0.165	632	0.220	1,724				
	Washington-Oregon	0.332	1,275	0.016	128				
	Total		3,838		7,840		2,693		14,371

Appendix C.9. Estimated contribution of Alaska hatchery, Alaska wild, British Columbia, and Washington-Oregon age-1.2, 1.3, and 1.4 chinook salmon to the 1982 Southeast Alaska summer troll fishery, Southern Inside area, based on analysis of scale patterns.

Date	Stock of Origin	Age-1.2		Age-1.3		Age-1.4		Total	
		Proportion	Number	Proportion	Number	Proportion	Number	Proportion	Number
5/15-7/03	Alaska Hatchery	0.046	182	0.053	266	0.025	37	0.046	485
	Alaska Wild	0.525	2,073	0.750	3,782	0.523	770	0.633	6,625
	Non-Alaska					0.453	668	0.320	3,350
	British Columbia	0.163	645	0.176	885				
	Washington-Oregon	0.267	1,056	0.019	96				
	Total		3,956		5,029		1,475		10,460
7/04-7/28	Alaska Hatchery	0.000	0	0.020	39	0.000	0	0.006	39
	Alaska Wild	0.574	2,264	0.862	1,661	0.187	30	0.655	3,955
	Non-Alaska					0.813	128	0.338	2,043
	British Columbia	0.328	1,296	0.118	228				
	Washington-Oregon	0.099	391	0.000	0				
	Total		3,951		1,928		158		6,037
Total	Alaska Hatchery	0.023	182	0.044	305	0.023	37	0.032	524
	Alaska Wild	0.549	4,337	0.782	5,443	0.490	800	0.641	10,580
	Non-Alaska					0.487	796	0.327	5,393
	British Columbia	0.245	1,941	0.160	1,113				
	Washington-Oregon	0.183	1,447	0.014	96				
	Total		7,907		6,957		1,633		16,497

Appendix C.10. Estimated contribution of Alaska hatchery, Alaska wild, British Columbia, and Washington-Oregon age-1.2, 1.3, and 1.4 chinook salmon to the 1982 Southeast Alaska District 104 purse seine fishery and the Districts 101 and 111 gill net fisheries, based on analysis of scale patterns.

Fishery/ District	Date	Stock of Origin	Age-1.2		Age-1.3		Age-1.4		Total	
			Proportion	Number	Proportion	Number	Proportion	Number	Proportion	Number
Purse Seine										
Dist. 104	5/15-7/03	Alaska Hatchery	0.000	0	0.000	0	0.058	36	0.010	36
		Alaska Wild	0.055	53	0.497	930	0.176	110	0.315	1,094
		Non-Alaska					0.766	479	0.674	2,338
		British Columbia	0.183	178	0.379	710				
		Washington-Oregon	0.762	740	0.124	232				
		Total	1.000	971	1.000	1,872	1.000	625	1.000	3,468
Gill Net										
Dist.101,111	7/04-7/28	Alaska Hatchery	0.000	0	0.000	0	0.000	0	0.000	0
		Alaska Wild	0.700	2,406	0.782	1,351	0.930	1,126	0.766	4,883
		Non-Alaska					0.070	85	0.234	1,492
		British Columbia	0.252	866	0.218	376				
		Washington-Oregon	0.048	165	0.000	0				
		Total	1.000	3,437	1.000	1,727	1.000	1,211	1.000	6,375

Appendix C.11. Estimated stock composition of chinook salmon harvested in the Southeast Alaska winter winter troll fishery, 8 March to 14 April 1982. The contribution of Alaska hatchery age-1. fish is estimated from scale pattern data.

Area	Stock of Origin	Age Group 0.[a]	1.2,1.3,1.4[b]	1.1	1.5,1.6[c]	2.,3.[c]	Total	Percent
Northern Outside	Alaska Hatchery	6	94		0	0	100	3.1
	Alaska Wild	0	417		23	15	455	13.9
	B.C./Wa./Or.	1,894	801		13	8	2,716	83.0
	Total	1,900	1,312		36	23	3,271	100.0
Southern Outside	Alaska Hatchery	6	20		0		26	2.1
	Alaska Wild	0	151		4		155	12.6
	B.C./Wa./Or.	827	225		2		1,054	85.3
	Total	833	396		6		1,235	100.0
Northern Inside	Alaska Hatchery	1	19		0	0	20	2.4
	Alaska Wild	0	75		1	0	76	9.1
	B.C./Wa./Or.	532	201		2	1	736	88.5
	Total	533	295		3	1	832	100.0
Southern Inside	Alaska Hatchery	0	46			0	46	4.0
	Alaska Wild	0	240			4	244	21.2
	B.C./Wa./Or.	472	383			5	860	74.8
	Total	472	669			9	1,150	100.0
Total	Alaska Hatchery	13[d]	179	0	0	0	192	3.0
	Alaska Wild	0	883	0	28	19	930	14.3
	B.C./Wa./Or.	3,725	1,610	0	17	14	5,366	82.7
	Total	3,738	2,672	0	45	33	6,488	100.0

[a] Stock classification based on age composition and CWT data.
[b] Stock classification based on scale pattern analysis.
[c] These age-1.5, 1.6, 2., and 3. fish were classified to stock of origin using the proportions derived from the age-1.4 Alaska vs B.C./Wa./Or. scale pattern model.
[d] Based on CWT data Alaskan hatcheries contributed 13 age-0. fish to this area.

Appendix C.12. Estimated stock composition of chinook salmon harvested in the Southeast Alaska summer troll fishery, Northern Outside area, 1982. The contribution of Alaska hatchery age-1. fish is estimated from scale pattern data.

Date	Stock of Origin	Age Group 0.[a]	1.2,1.3,1.4[b]	1.1[c]	1.5,1.6[d]	2.,3.[d]	Total	Percent
5/15-5/29	Alaska Hatchery	-	637	0	3	4	644	3.6
	Alaska Wild	0	5,411	0	57	75	5,543	31.3
	B.C./Wa./Or.	7,916	3,625	0	3	5	11,549	65.1
	Total	7,916	9,673	0	63	84	17,736	100.0
5/30-6/05[e]	Alaska Hatchery	-	1,128	0	14	14	1,156	7.5
	Alaska Wild	0	2,841	0	52	52	2,945	19.1
	B.C./Wa./Or.	7,889	3,417	0	18	18	11,342	73.4
	Total	7,889	7,386	0	84	84	15,443	100.0
6/6-6/19	Alaska Hatchery	-	1,834	15	50	70	1,969	8.2
	Alaska Wild	0	2,116	17	60	84	2,277	9.5
	B.C./Wa./Or.	14,872	4,583	38	64	90	19,647	82.2
	Total	14,872	8,533	70	174	244	23,893	100.0
6/20-6/26[e]	Alaska Hatchery	-	1,049	2	31	54	1,136	5.9
	Alaska Wild	0	1,925	4	25	43	1,997	10.4
	B.C./Wa./Or.	11,612	4,299	10	55	94	16,070	83.7
	Total	11,612	7,273	16	111	191	19,203	100.0
6/27-7/03	Alaska Hatchery	-	508	0	17	39	564	4.0
	Alaska Wild	0	1,570	0	6	14	1,590	11.3
	B.C./Wa./Or.	8,362	3,477	0	37	87	11,963	84.7
	Total	8,362	5,555	0	60	140	14,117	100.0
7/04-7/10[e]	Alaska Hatchery	-	195	0	30	9	234	2.5
	Alaska Wild	0	916	0	31	9	956	10.1
	B.C./Wa./Or.	6,820	1,380	0	28	8	8,236	87.4
	Total	6,820	2,491	0	89	26	9,426	100.0
7/11-7/17	Alaska Hatchery	-	204	4	0	20	228	1.6
	Alaska Wild	0	1,429	31	0	30	1,490	10.2
	B.C./Wa./Or.	11,112	1,787	40	0	0	12,939	88.3
	Total	11,112	3,420	75	0	50	14,657	100.0
7/18-7/24[e]	Alaska Hatchery	-	78	0	3	17	98	0.8
	Alaska Wild	0	1,274	6	5	33	1,318	11.0
	B.C./Wa./Or.	9,120	1,420	6	4	21	10,571	88.2
	Total	9,120	2,772	12	12	71	11,987	100.0
7/25-7/28	Alaska Hatchery	-	32	0	3	0	35	0.2
	Alaska Wild	0	2,016	11	12	0	2,039	14.4
	B.C./Wa./Or.	10,584	1,505	8	23	0	12,120	85.4
	Total	10,584	3,553	19	38	0	14,194	100.0
Total	Alaska Hatchery	16[f]	5,665	21	151	227	6,080	4.3
	Alaska Wild	0	19,498	69	248	340	20,155	14.3
	B.C./Wa./Or.	88,271	25,493	102	232	323	114,421	81.3
	Total	88,287	50,656	192	631	890	140,656	100.0

[a] Stock classification based on age composition and CWT data. The catch of Alaska hatcherry fish is only presented for the season total.
[b] Stock classification based on scale pattern analysis.
[c] These age-1.1 fish were classified to stock of origin using the proportions derived from the combined age-1.2, 1.3, and 1.4 Alaska hatchery vs Alaska wild vs B.C./Wa./Or. scale pattern model.
[d] These age-1.5, 1.6, and 2. fish were classified to stock of origin using the proportions derived from the age-1.4 Alaska hatchery vs Alaska wild vs B.C./Wa./Or. scale pattern model.
[e] Interpolated from adjacent weeks.
[f] The estimate of Alaskan hatchery fish is based on weighting the CWT estimate of 143 fish by the catch in this area.

Appendix C.13. Estimated stock composition of chinook salmon harvested in the Southeast Alaska summer troll fishery,Southern Outside area, 1982. The contribution of Alaska hatchery age-1. fish estimated from scale pattern data.

Date	Stock of Origin	Age Group 0.[a]	1.2,1.3,1.4[b]	1.1[c]	1.5,1.6[d]	2.,3.[d]	Total	Percent
5/15-6/12	Alaska Hatchery	-	0	0	0	0	0	0.0
	Alaska Wild	0	4,175	0	23	36	4,234	26.9
	B.C./Wa./Or.	7,990	3,387	0	54	87	11,518	73.1
	Total	7,990	7,562	0	77	123	15,752	100.0
6/13-7/10	Alaska Hatchery	-	445	0	1	3	449	3.1
	Alaska Wild	0	2,340	0	1	5	2,346	16.0
	B.C./Wa./Or.	7,836	3,811	0	42	167	11,856	80.9
	Total	7,836	6,596	0	44	175	14,651	100.0
7/11-7/28	Alaska Hatchery	-	47	1	0	0	48	0.6
	Alaska Wild	0	955	22	0	0	977	12.2
	B.C./Wa./Or.	4,979	1,826	43	13	93	6,954	87.2
	Total	4,979	2,828	66	13	93	7,979	100.0
Total	Alaska Hatchery	7[e]	492	1	1	3	504	1.3
	Alaska Wild	0	7,470	22	24	41	7,557	19.7
	B.C./Wa./Or.	20,798	9,024	43	109	347	30,321	79.0
	Total	20,805	16,986	66	134	391	38,382	100.0

[a] Stock classification based on age composition data and CWT data. The catch of Alaska hatchery fish is only presented for the season total.

[b] Stock classification based on scale pattern analysis.

[c] These age-1.1 fish were classified to stock of origin using the proportions derived from the combined age-1.2, 1.3, and 1.4 Alaska hatchery vs Alaska wild vs B.C./Wa./Or. scale pattern model.

[d] These age-1.5, 1.6, and 2. fish were classified to stock of origin using the proportions derived from the age-1.4 Alaska hatchery vs Alaska wild vs B.C./Wa./Or. scale pattern model.

[e] The estimate of Alaskan hatchery fish is based on weighting the CWT estimate of 143 fish by the catch in this area.

Appendix C.14. Estimated stock composition of chinook salmon harvested is the Southeast Alaska summer troll fishery, Northern Inside area, 1982. The contribution of Alaska hatchery age-1. fish is estimated from scale pattern data.

Date	Stock of Origin	Age Group 0.[a]	1.2,1.3,1.4[b]	1.1[c]	1.5,1.6[d]	2.,3.[d]	Total	Percent
5/15-6/05	Alaska Hatchery	-	65	0	2	2	69	1.6
	Alaska Wild	0	1,800	0	49	33	1,882	44.2
	B.C./Wa./Or.	1,609	665	0	20	13	2,307	54.2
	Total	1,609	2,530	0	71	48	4,258	100.0
6/06-6/26	Alaska Hatchery	-	354	0	4	3	361	5.1
	Alaska Wild	0	2,630	0	46	36	2,712	38.1
	B.C./Wa./Or.	2,859	1,170	0	8	6	4,043	56.8
	Total	2,859	4,154	0	58	45	7,116	100.0
6/27-7/17	Alaska Hatchery	-	253	0	0	6	259	3.1
	Alaska Wild	0	3,137	0	5	80	3,222	38.8
	B.C./Wa./Or.	3,184	1,575	0	4	61	4,824	58.1
	Total	3,184	4,965	0	9	147	8,305	100.0
7/18-7/28	Alaska Hatchery	-	57	2	0	0	59	1.3
	Alaska Wild	0	1,626	43	8	0	1,677	35.6
	B.C./Wa./Or.	1,903	1,039	28	7	0	2,977	63.2
	Total	1,903	2,722	73	15	0	4,713	100.0
Total	Alaska Hatchery	99[e]	729	2	6	11	847	3.5
	Alaska Wild	0	9,193	43	108	149	9,493	39.0
	B.C./Wa./Or.	9,456	4,449	28	39	80	14,052	57.8
	Total	9,555	14,371	73	73	240	24,312	100.0

[a] Stock classification based on age composition data and CWT data. The catch of Alaska hatchery fish is only presented for the season total.
[b] Stock classification based on scale pattern analysis.
[c] These age-1.1 fish were classified to stock of origin using the proportions derived from the combined age-1.2, 1.3, and 1.4 Alaska hatchery vs Alaska wild vs B.C./Wa./Or. scale pattern model.
[d] These age-1.5, 1.6, and 2. fish were classified to stock of origin using the proportions derived from the age-1.4 Alaska hatchery vs Alaska wild vs B.C./Wa./Or. scale pattern model.
[e] The estimate of Alaskan hatchery fish is based on weighting the CWT estimate of 143 fish by the catch in this area.

Appendix C.15. Estimated stock composition of chinook salmon harvested in the Southeast Alaska summer troll fishery, Southern Inside area, 1982. The contribution of Alaska hatchery age-1. fish is estimated from scale pattern data.

Date	Stock of Origin	Age Group 0.[a]	1.2,1.3,1.4[b]	1.1[c]	1.5,1.6[d]	2.,3.[d]	Total	Percent
5/15-7/03	Alaska Hatchery	-	485	0	1	3	489	3.2
	Alaska Wild	0	6,625	0	24	70	6,719	44.3
	B.C./Wa./Or.	4,535	3,350	0	20	60	7,965	52.5
	Total	4,535	10,460	0	45	133	15,173	100.0
7/04-7/28	Alaska Hatchery	-	39	0	0	0	39	0.4
	Alaska Wild	0	3,955	52	6	39	4,052	41.2
	B.C./Wa./Or.	3,478	2,043	27	26	167	5,741	58.4
	Total	3,478	6,037	79	32	206	9,832	100.0
Total	Alaska Hatchery	7[e]	524	0	1	3	535	2.1
	Alaska Wild	0	10,580	52	30	109	10,771	43.1
	B.C./Wa./Or.	8,006	5,393	27	46	227	13,699	54.8
	Total	8,013	16,497	79	77	339	25,005	100.0

[a] Stock classification based on age composition data and CWT data. The catch of Alaska hatchery fish is only presented for the season total.

[b] Stock classification based on scale pattern analysis.

[c] These age-1.1 fish were classified to stock of origin using the proportions derived from the combined age-1.2, 1.3, and 1.4 Alaska hatchery vs Alaska wild vs B.C./Wa./Or. scale pattern model.

[d] These age-1.5, 1.6, and 2. fish were classified to stock of origin using the proportions derived from the age-1.4 Alaska hatchery vs Alaska wild vs B.C./Wa./Or. scale pattern model.

[e] The estimate of Alaskan hatchery fish is based on weighting the CWT estimate of 143 fish by the catch in this area.

Appendix C.16. Estimated stock composition of chinook salmon harvested in the Southeast Alaska troll, seine, and and gill net fisheries, 1982. The contribution of Alaska hatchery age-1. fish is estimated from scale pattern data.

Fishery/ Time Period	Area	Stock of Origin	Age Group 0.[a]	1.2,1.3,1.4[b]	1.1[c]	1.5,1.6[d]	2.,3.[d]	Total	Percent
Troll									
Winter Fishery 8 March-14 April	All	Alaska Hatchery	13	179	0	0	0	192	3.0
		Alaska Wild	0	883	0	28	19	930	14.3
		B.C./Wa./Or.	3,725	1,610	0	17	14	5,366	82.7
		Total	3,738	2,672	0	45	33	6,488	100.0
Summer Fishery 15 May-28 July	Northern Outside	Alaska Hatchery	16	5,665	21	151	227	6,080	4.3
		Alaska Wild	0	19,498	69	248	340	20,155	14.3
		B.C./Wa./Or.	88,271	25,493	102	232	323	114,421	81.3
		Total	88,287	50,656	192	631	890	140,656	100.0
	Southern Outside	Alaska Hatchery	7	492	1	1	3	504	1.3
		Alaska Wild	0	7,470	22	24	41	7,557	19.7
		B.C./Wa./Or.	20,798	9,024	43	109	347	30,321	79.0
		Total	20,805	16,986	66	134	391	38,382	100.0
	Northern Inside	Alaska Hatchery	99	729	2	6	11	847	3.5
		Alaska Wild	0	9,193	43	108	149	9,493	38.9
		B.C./Wa./Or.	9,456	4,449	28	39	80	14,052	57.6
		Total	9,555	14,371	73	153	240	24,392	100.0
	Southern Inside	Alaska Hatchery	7	524	0	1	3	535	2.1
		Alaska Wild	0	10,580	52	30	109	10,771	43.1
		B.C./Wa./Or.	8,006	5,393	27	46	227	13,699	54.8
		Total	8,013	16,497	79	77	339	25,005	100.0
Summer Fishery	Total	Alaska Hatchery	129	7,410	24	159	244	7,966	3.5
		Alaska Wild	0	46,741	186	410	639	47,976	21.0
		B.C./Wa./Or.	126,531	44,359	200	426	977	172,493	75.5
		Total	126,660	98,510	410	995	1,860	228,435	100.0
Seine									
	Dist. 104	Alaska Hatchery	0	36	0	1	15	52	0.2
		Alaska Wild	0	1,094	8	4	45	1,150	5.4
		B.C./Wa./Or.	17,708	2,338	16	19	194	20,275	94.4
		Total	17,708	3,468	24	24	254	21,478	100.0
Gill net									
	Dist 101, 111	Alaska Hatchery	0	0	0	0	0	0	0.0
		Alaska Wild	0	4,883	109	33	67	5,092	67.0
		B.C./Wa./Or.	978	1,492	33	3	5	2,511	33.0
		Total	978	6,375	142	36	72	7,603	100.0
Grand Total		Alaska Hatchery	142	7,625	24	160	259	8,210	3.2
		Alaska Wild	0	53,601	302	476	770	55,149	21.1
		B.C./Wa./Or.	148,942	49,799	249	465	1,190	200,645	75.7
		Total	149,084	111,025	576	1,100	2,219	264,004	100.0

[a] Stock classification based on age composition data and CWT data. The catch of Alaska hatchery fish is only presented for the season total.

[b] Stock classification based on scale pattern analysis.

[c] These age-1.1 fish were classified to stock of origin using the proportions derived from the combined age-1.2, 1.3, and 1.4 Alaska hatchery vs Alaska wild vs B.C./Wa./Or. scale pattern model.

[d] These age-1.5, 1.6, and 2. fish were classified to stock of origin using the proportions derived from the age-1.4 Alaska hatchery vs Alaska wild vs B.C./Wa./Or. scale pattern model.

Appendix D.1. Stock composition estimates and standard errors calculated from scale patterns in a 3-way Alaska wild, British Columbia, Washington-Oregon model for age-1.2 chinook salmon harvested in Southeast Alaska troll, seine, and gill net fisheries, 1982.

Fishery/ Area	Date	Sample Size	Stock Composition Estimates and Standard Error (in Parenthesis) Alaska	British Columbia	Wash.-Oregon
Troll					
All Areas Combined	3/08-4/15	35	.284(.10272)	.262(.12654)	.454(.11673)
Northern Outside	5/15-5/29	98	.249(.06152)	.262(.07992)	.489(.07413)
	6/06-6/19	97	.287(.06274)	.170(.07693)	.543(.07561)
	7/27-7/03	97	.251(.06086)	.149(.07713)	.599(.07727)
	7/11-7/17	97	.153(.05477)	.122(.07909)	.724(.07997)
	7/25-7/28	70	.229(.06888)	.116(.08737)	.655(.08989)
Southern Outside	5/15-6/12	95	.373(.06656)	.153(.07522)	.474(.07327)
	6/13-7/10	80	.278(.06956)	.299(.08770)	.423(.07829)
	7/11-7/28	88	.270(.06478)	.174(.08065)	.556(.07436)
Northern Inside	5/15-6/05	33	.574(.11502)	.173(.11831)	.253(.09892)
	6/06-6/26	57	.342(.08264)	.127(.09299)	.531(.09461)
	6/27-7/17	97	.489(.06882)	.156(.07297)	.355(.06627)
	7/18-7/28	92	.449(.07019)	.209(.07722)	.342(.06769)
Southern Inside	5/15-7/03	96	.493(.06941)	.178(.07414)	.330(.06517)
	7/04-7/28	95	.574(.07261)	.328(.07942)	.099(.04552)
Seine					
District 104	6/27-10/6	25	.055(.08544)	.183(.14960)	.762(.14482)
Gill Net					
Districts 101, 111	6/6-10/23	145	.700(.06059)	.252(.06520)	.049(.02994)

Appendix D.2. Stock composition estimates and standard errors calculated from scale patterns in a 3-way Alaska wild, British Columbia, Washington-Oregon model for age-1.3 chinook salmon harvested in Southeast Alaska troll, seine, and gill net fisheries, 1982.

Fishery/ Area	Date	Sample Size	Stock Composition Estimates and Standard Error (in Parenthesis)		
			Alaska	British Columbia	Washington-Oregon
Troll					
Northern Outside	3/08-4/15	100	.373(.06764)	.603(.06751)	.024(.02352)
	5/15-5/29	100	.536(.06807)	.386(.06606)	.077(.03362)
	6/06-6/19	77	.425(.07398)	.377(.07320)	.197(.05183)
	7/27-7/03	143	.491(.05801)	.429(.05688)	.079(.02851)
	7/11-7/17	68	.532(.07992)	.310(.07582)	.158(.05147)
	7/25-7/28	60	.918(.05476)	.082(.05476)	.000
Southern Outside	3/08-4/15	45	.395(.09660)	.501(.09750)	.104(.05355)
	5/15-6/12	100	.724(.05589)	.276(.05589)	.000
	6/13-7/10	99	.662(.05819)	.338(.05819)	.000
	7/11-7/28	82	.582(.07501)	.387(.07285)	.030(.02852)
Northern Inside	3/08-4/15	99	.303(.06549)	.625(.06723)	.071(.03184)
	5/15-6/05	97	.782(.06563)	.187(.06125)	.029(.02802)
	6/06-6/26	85	.756(.07058)	.232(.06715)	.012(.02537)
	6/27-7/17	130	.831(.05699)	.146(.05274)	.022(.02422)
	7/18-7/28	97	.737(.05614)	.263(.05614)	.000
Southern Inside	3/08-4/15	51	.548(.08258)	.452(.08258)	.000
	5/15-7/03	98	.761(.06587)	.198(.06129)	.041(.02976)
	7/04-7/28	72	.844(.07207)	.154(.06805)	.002(.02527)
Seine					
District 104	6/27-10/6	61	.496(.08461)	.379(.08239)	.124(.04972)
Gill Net					
Districts 101, 111	6/16-10/23	16	.782(.12722)	.218(.12722)	.000

Appendix D.3. Stock composition estimates and standard errors calculated from scale patterns in a 2-way Alaska wild, British Columbia, Washington-Oregon model for age-1.4 chinook salmon harvested in Southeast Alaska troll, seine, and gill net fisheries, 1982.

Fishery/ Area	Date	Sample Size	Stock Composition Estimates		Standard Error
			Alaska	Non-Alaska	
Troll					
Northern Outside	5/15-5/29	100	.871	.129	.06189
	6/06-6/19	92	.330	.670	.07568
	6/27-7/03	43	.273	.727	.10395
	7/11-7/17	36	.025	.975	.09440
	7/25-7/28	16	.308	.692	.16725
Southern Outside	5/15-6/12	82	.296	.704	.07899
	6/13-7/10	46	.065	.935	.08926
	7/11-7/28	11	.000	1.000	
Outside Areas Combined	3/08-4/15	82	.643	.357	.07699
Northern Inside	5/15-6/05	74	.734	.266	.07741
	6/06-6/26	65	.885	.115	.07297
	6/27-7/17	44	.570	.430	.10458
	7/18-7/28	17	.518	.482	.16639
Southern Inside	5/15-7/03	51	.624	.376	.09621
	7/04-7/28	7	.187	.813	.23445
Inside Areas Combined	3/08-4/15	68	.438	.562	.08680
Seine					
District 104	6/27-10/6	19	.085	.915	.13306
Gill Net					
Districts 101, 111	6/6-10/23	54	.930	.070	.07479

Appendix D.4. Estimated contribution of Alaska wild, British Columbia, and Washington-Oregon age-1.2, 1.3 and 1.4 chinook salmon to the Southeast Alaska winter troll fishery, 8 March to 14 April 1982, based on analysis of scale patterns.

Area	Stock of Origin	Age-1.2		Age-1.3		Age-1.4		Total	
		Proportion	Number	Proportion	Number	Proportion	Number	Proportion	Number
Northern Outside	Alaska	0.284	13	0.373	337	0.643	233	0.445	583
	Non-Alaska					0.357	130	0.555	729
	British Columbia	0.262	12	0.603	545				
	Washington-Oregon	0.454	21	0.024	22				
	Total		46		903		363		1,312
Southern Outside	Alaska	0.284	18	0.395	114	0.643	29	0.406	161
	Non-Alaska					0.357	16	0.594	235
	British Columbia	0.262	16	0.501	145				
	Washington-Oregon	0.454	28	0.104	30				
	Total		62		289		45		396
Northern Inside	Alaska	0.284	7	0.303	53	0.438	41	0.344	101
	Non-Alaska					0.562	52	0.656	193
	British Columbia	0.262	7	0.625	110				
	Washington-Oregon	0.454	12	0.071	12				
	Total		26		176		93		295
Southern Inside	Alaska	0.284	34	0.548	259	0.438	34	0.488	326
	Non-Alaska					0.562	43	0.512	343
	British Columbia	0.262	31	0.452	213				
	Washington-Oregon	0.454	54	0.000	0				
	Total		120		472		77		669
Total	Alaska	0.284	72	0.415	763	0.583	337	0.439	1,172
	Non-Alaska					0.417	241	0.561	1,500
	British Columbia	0.262	67	0.550	1,013				
	Washington-Oregon	0.454	115	0.035	64				
	Total		254		1,840		578		2,672

Appendix D.5. Estimated contribution of Alaska wild, British Columbia, and Washington-Oregon age-1.2, 1.3 and 1.4 chinook salmon to the 1982 Southeast Alaska summer troll fishery, Northern Outside area, based on analysis of scale patterns.

Date	Stock of Origin	Age-1.2		Age-1.3		Age-1.4		Total	
		Proportion	Number	Proportion	Number	Proportion	Number	Proportion	Number
5/15-5/29	Alaska	0.249	302	0.536	2,782	0.871	2,857	0.614	5,941
	Non-Alaska					0.129	423	0.386	3,732
	British Columbia	0.262	317	0.386	2,000				
	Washington-Oregon	0.489	593	0.077	399				
	Total		1,212		5,181		3,280		9,673
5/30-6/05[a]	Alaska	0.268	270	0.418	2,147	0.601	1,150	0.483	3,567
	Non-Alaska					0.399	764	0.517	3,819
	British Columbia	0.216	217	0.382	1,706				
	Washington-Oregon	0.516	520	0.137	612				
	Total		1,007		4,465		1,914		7,386
6/06-6/19	Alaska	0.287	590	0.425	2,047	0.330	552	0.374	3,189
	Non-Alaska					0.670	1,120	0.626	5,344
	British Columbia	0.170	349	0.377	1,812				
	Washington-Oregon	0.543	1,116	0.197	947				
	Total		2,055		4,806		1,672		8,533
6/20-6/26[a]	Alaska	0.269	640	0.458	1,669	0.301	377	0.369	2,686
	Non-Alaska					0.699	875	0.631	4,587
	British Columbia	0.160	380	0.403	1,472				
	Washington-Oregon	0.571	1,357	0.138	503				
	Total		2,377		3,644		1,252		7,273
6/27-7/03	Alaska	0.251	430	0.491	1,429	0.273	256	0.381	2,115
	Non-Alaska					0.727	680	0.619	3,440
	British Columbia	0.149	256	0.429	1,248				
	Washington-Oregon	0.599	1,026	0.079	230				
	Total		1,712		2,907		936		5,555
7/04-7/10[a]	Alaska	0.202	139	0.512	733	0.149	55	0.372	927
	Non-Alaska					0.851	315	0.628	1,564
	British Columbia	0.136	94	0.370	529				
	Washington-Oregon	0.662	457	0.118	169				
	Total		690		1,431		370		2,491
7/11-7/17	Alaska	0.153	186	0.532	936	0.025	11	0.331	1,133
	Non-Alaska					0.975	442	0.669	2,287
	British Columbia	0.122	147	0.310	546				
	Washington-Oregon	0.724	874	0.158	278				
	Total		1,207		1,760		453		3,420
7/18-7/24[a]	Alaska	0.191	243	0.725	881	0.166	47	0.422	1,171
	Non-Alaska					0.834	236	0.578	1,601
	British Columbia	0.119	152	0.196	238				
	Washington-Oregon	0.690	879	0.079	96				
	Total		1,274		1,215		283		2,772
7/25-7/28	Alaska	0.229	340	0.918	1,560	0.308	113	0.567	2,013
	Non-Alaska					0.692	254	0.433	1,540
	British Columbia	0.116	173	0.082	139				
	Washington-Oregon	0.655	974	0.000	0				
	Total		1,487		1,699		367		3,553
Total	Alaska	0.241	3,140	0.523	14,184	0.515	5,418	0.449	22,742
	Non-Alaska					0.485	5,109	0.551	27,914
	British Columbia	0.160	2,085	0.357	9,690				
	Washington-Oregon	0.599	7,796	0.119	3,234				
	Total		13,021		27,108		10,527		50,656

[a] The proportions for this period were linearly interpolated from the adjacent periods.

Appendix D.6. Estimated contribution of Alaska wild, British Columbia, and Washington-Oregon age-1.2, 1.3 and 1.4 chinook salmon to the 1982 Southeast Alaska summer troll fishery, Southern Outside area, based on analysis of scale patterns.

Date	Stock of Origin	Age-1.2		Age-1.3		Age-1.4		Total	
		Proportion	Number	Proportion	Number	Proportion	Number	Proportion	Number
5/15-6/12	Alaska	0.373	648	0.724	3,049	0.296	478	0.552	4,175
	Non-Alaska					0.704	1,136	0.448	3,387
	British Columbia	0.153	266	0.276	1,162				
	Washington-Oregon	0.474	823	0.000	0				
	Total		1,737		4,211		1,614		7,562
6/13-7/10	Alaska	0.278	533	0.662	2,319	0.065	76	0.444	2,928
	Non-Alaska					0.935	1,100	0.556	3,668
	British Columbia	0.299	573	0.338	1,185				
	Washington-Oregon	0.423	810	0.000	0				
	Total		1,916		3,504		1,176		6,596
7/11-7/28	Alaska	0.270	376	0.582	750	0.000	0	0.398	1,126
	Non-Alaska					1.000	146	0.602	1,702
	British Columbia	0.174	243	0.387	499				
	Washington-Oregon	0.556	775	0.030	39				
	Total		1,394		1,288		146		2,828
Total	Alaska	0.309	1,557	0.680	6,118	0.189	554	0.484	8,229
	Non-Alaska					0.811	2,382	0.516	8,757
	British Columbia	0.214	1,082	0.316	2,846				
	Washington-Oregon	0.477	2,408	0.004	39				
	Total		5,047		9,003		2,936		16,986

Appendix D.7. Estimated contribution of Alaska wild, British Columbia, and Washington-Oregon age-1.2, 1.3 and 1.4 chinook salmon to the 1982 Southeast Alaska summer troll fishery, Northern Inside area, based on analysis of scale patterns.

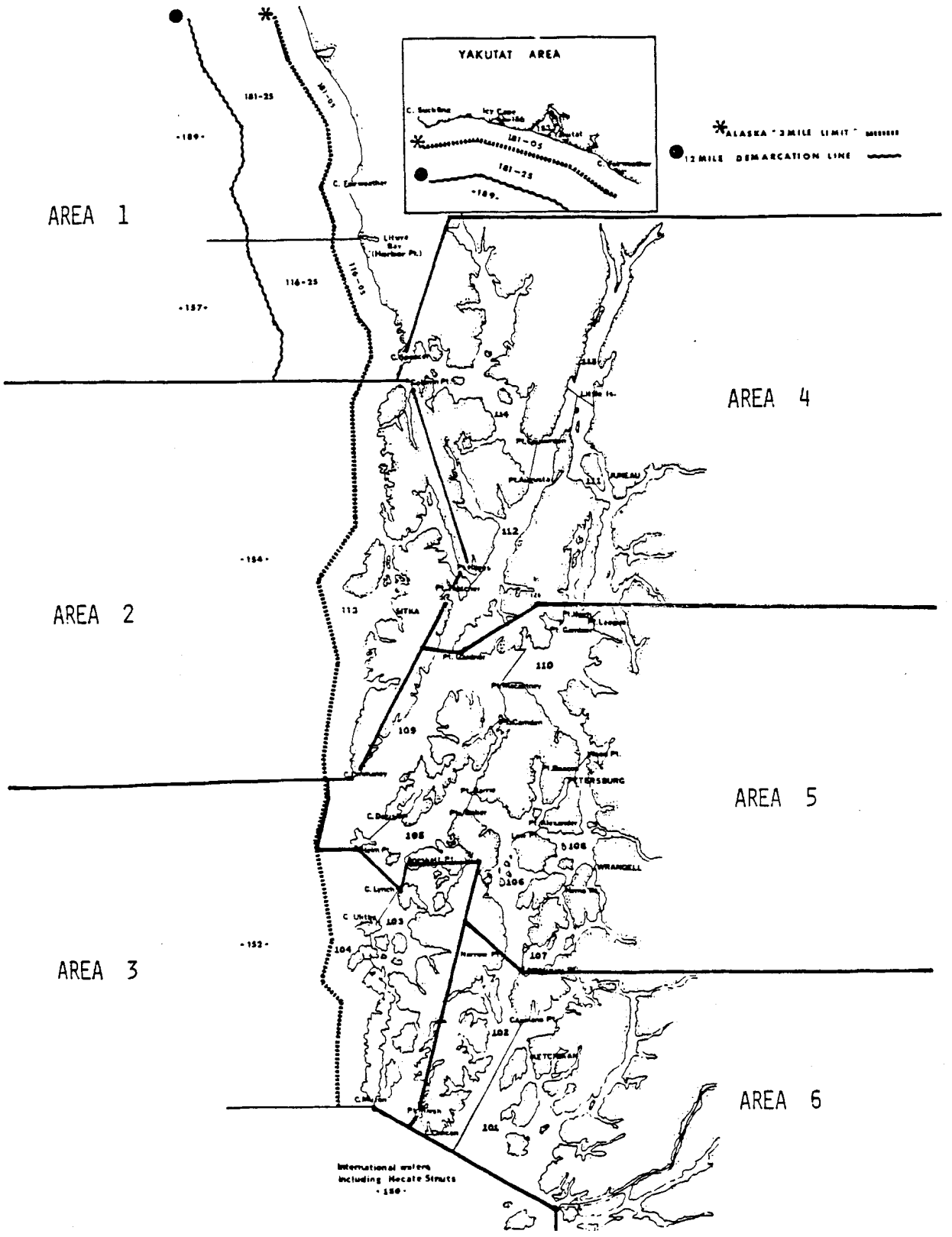
Date	Stock of Origin	Age-1.2		Age-1.3		Age-1.4		Total	
		Proportion	Number	Proportion	Number	Proportion	Number	Proportion	Number
5/15-6/05	Alaska	0.574	244	0.782	1,068	0.734	544	0.734	1,856
	Non-Alaska					0.266	197	0.266	674
	British Columbia	0.173	74	0.187	255				
	Washington-Oregon	0.253	108	0.029	40				
	Total		426		1,363		741		2,530
6/06-6/26	Alaska	0.342	338	0.756	1,492	0.885	1,056	0.695	2,886
	Non-Alaska					0.115	137	0.305	1,268
	British Columbia	0.127	125	0.232	458				
	Washington-Oregon	0.531	524	0.012	24				
	Total		987		1,974		1,193		4,154
6/27-7/17	Alaska	0.489	633	0.831	2,580	0.570	324	0.712	3,537
	Non-Alaska					0.430	245	0.288	1,428
	British Columbia	0.156	202	0.146	454				
	Washington-Oregon	0.355	459	0.022	68				
	Total		1,294		3,102		569		4,965
7/18-7/28	Alaska	0.449	508	0.737	1,033	0.518	98	0.602	1,639
	Non-Alaska					0.482	92	0.398	1,083
	British Columbia	0.209	236	0.263	368				
	Washington-Oregon	0.342	387	0.000	0				
	Total		1,131		1,401		190		2,722
Total	Alaska	0.449	1,723	0.787	6,173	0.751	2,022	0.690	9,918
	Non-Alaska					0.249	671	0.310	4,453
	British Columbia	0.166	637	0.196	1,535				
	Washington-Oregon	0.385	1,478	0.017	132				
	Total		3,838		7,840		2,693		14,371

Appendix D.8. Estimated contribution of Alaska wild, British Columbia, and Washington-Oregon age-1.2, 1.3 and 1.4 chinook salmon to the 1982 Southeast Alaska summer troll fishery, Southern Inside area, based on analysis of scale patterns.

Date	Stock of Origin	Age-1.2		Age-1.3		Age-1.4		Total	
		Proportion	Number	Proportion	Number	Proportion	Number	Proportion	Number
5/15-7/03	Alaska	0.493	1,947	0.761	3,827	0.624	920	0.640	6,694
	Non-Alaska					0.376	555	0.360	3,766
	British Columbia	0.178	704	0.198	996				
	Washington-Oregon	0.330	1,305	0.041	206				
	Total		3,956		5,029		1,475		10,460
7/04-7/28	Alaska	0.574	2,264	0.844	1,627	0.187	30	0.649	3,921
	Non-Alaska					0.813	128	0.351	2,116
	British Columbia	0.328	1,296	0.154	297				
	Washington-Oregon	0.099	391	0.002	4				
	Total		3,951		1,928		158		6,037
Total	Alaska	0.533	4,211	0.784	5,454	0.582	950	0.643	10,615
	Non-Alaska					0.418	683	0.357	5,882
	British Columbia	0.253	2,000	0.186	1,293				
	Washington-Oregon	0.214	1,696	0.030	210				
	Total		7,907		6,957		1,633		16,497

Appendix D.9. Estimated contribution of Alaska wild, British Columbia, and Washington-Oregon age-1.2, 1.3 and 1.4 chinook salmon to the 1982 Southeast Alaska District 104 seine and Districts 101 and 111 gill net fisheries, based on analysis of scale patterns.

Fishery/ District	Stock of Origin	Age-1.2		Age-1.3		Age-1.4		Total	
		Proportion	Number	Proportion	Number	Proportion	Number	Proportion	Number
Purse Seine	Alaska	0.055	53	0.497	930	0.085	53	0.299	1,036
District 104	Non-Alaska					0.915	572	0.701	2,432
	British Columbia	0.183	178	0.379	710				
	Washington-Oregon	0.762	740	0.124	232				
	Total	1.000	971	1.000	1,872	1.000	625	1.000	3,468
Gill Net	Alaska	0.700	2,403	0.782	1,351	0.930	1,126	0.766	4,880
Districts 101	Non-Alaska					0.070	85	0.234	1,495
and 111	British Columbia	0.252	866	0.218	376				
	Washington-Oregon	0.048	168	0.000					
	Total	1.000	3,437	1.000	1,727	1.000	1,211	1.000	6,375



Appendix E.1. Map of Southeast Alaska showing the six areas used for analysis of the troll fishery performance data.

Appendix E.2. Troll fishery performance data for chinook salmon by week and area, 1982.

Week	FPD Area	Landings Sampled	Boat Days Sampled	Chinook Sampled	Chinook Per Boat Day
5/6-5/22	1	2	11.0	441	40.1
	2	4	19.0	162	8.5
	3	0	0.0	0	
	4	5	13.0	47	3.6
	5	0	0.0	0	
	6	0	0.0	0	
	Total	11	43.0	650	15.1
5/23-5/29	1	11	50.0	1,030	20.6
	2	31	145.0	1,042	7.2
	3	14	46.0	328	7.1
	4	26	70.0	544	7.8
	5	21	65.0	458	7.0
	6	10	53.0	453	8.5
	Total	113	429.0	3,855	9.0
5/30-6/05	1	20	119.5	2,266	19.0
	2	46	245.0	2,208	9.0
	3	10	52.5	317	6.0
	4	38	99.0	830	8.4
	5	48	145.5	1,003	6.9
	6	18	75.5	502	6.6
	Total	180	737.0	7,126	9.7
6/06-6/19	1	48	374.0	8,408	22.5
	2	41	240.0	2,566	10.7
	3	28	120.5	1,457	12.1
	4	8	33.0	415	12.6
	5	51	243.0	1,730	7.1
	6	25	106.5	984	9.2
	Total	201	1,117.0	15,560	13.9
6/20-6/26	1	20	88.0	1,078	12.3
	2	86	465.5	4,641	10.0
	3	32	136.0	914	6.7
	4	7	32.0	405	12.7
	5	59	225.0	1,864	8.3
	6	34	165.5	1,513	9.1
	Total	238	1,112.0	10,415	9.4
6/27-7/03	1	12	81.0	1,570	19.4
	2	85	427.5	3,273	7.7
	3	20	59.0	435	7.4
	4	7	35.0	217	6.2
	5	35	114.0	799	7.0
	6	37	139.0	763	5.5
	Total	196	855.5	7,057	8.2

-Continued-

Appendix E.2. (p. 2 of 2)

Week	FPD Area	Landings Sampled	Boat Days Sampled	Chinook Sampled	Chinook Per Boat Day
7/04-7/10	1	3	18.0	152	8.4
	2	65	329.5	2,122	6.4
	3	15	48.0	269	5.6
	4	6	15.5	106	6.8
	5	55	154.0	883	5.7
	6	15	54.0	559	10.4
	Total	159	619.0	4,091	6.6
7/11-7/17	1	8	31.0	361	11.6
	2	84	487.0	2,946	6.0
	3	18	61.0	382	6.3
	4	4	23.0	206	9.0
	5	58	156.5	557	3.6
	6	23	123.0	550	4.5
	Total	195	881.5	5,002	5.7
7/18-7/24	1	3	25.0	163	6.5
	2	51	318.5	1,548	4.9
	3	14	51.5	194	3.8
	4	9	10.5	21	2.0
	5	50	116.5	642	5.5
	6	28	106.0	398	3.8
	Total	155	628.0	2,966	4.7
7/25-7/31	1	11	63.5	464	7.3
	2	61	299.5	2,155	7.2
	3	28	96.5	438	4.5
	4	7	21.0	185	8.8
	5	74	210.0	1,071	5.1
	6	43	205.5	1,079	5.3
	Total	224	896.0	5,392	6.0
Combined Periods	1	138	861.0	15,933	18.5
	2	554	2,976.5	22,663	7.6
	3	179	671.0	4,734	7.1
	4	117	352.0	2,976	8.5
	5	451	1,429.5	9,007	6.3
	6	233	1,028.0	6,801	6.6
	Total	1672	7,318.0	62,114	8.5

Appendix E.3. Catch per boat day of Alaska and non-Alaska chinook salmon by area and period for the Southeast Alaska summer troll fishery, 1982. Catch per boat day was calculated from Troll Fishery Performance data.

Area	Period	Catch			Sampled Catch Per Boat Day	Calculated Total Fleet Boat Days	Catch Per Boat Day	
		Alaska	Non-Ak.	Total			Alaska	Non-Alaska
Northern Outside	5/16-5/29	6,069	11,667	17,736	11.9	1,492	4.1	7.8
	5/30-6/05	3,667	11,776	15,443	12.3	1,258	2.9	9.4
	6/06-6/19	3,353	20,540	23,893	17.9	1,337	2.5	15.4
	6/20-6/26	2,782	16,421	19,203	10.3	1,859	1.5	8.8
	6/27-7/03	2,169	11,948	14,117	9.5	1,482	1.5	8.1
	7/04-7/10	944	8,482	9,426	6.5	1,440	0.7	5.9
	7/11-7/17	1,159	13,498	14,657	6.4	2,296	0.5	5.9
	7/18-7/24	1,190	10,797	11,987	5.0	2,407	0.5	4.5
	7/25-7/31	2,036	12,158	14,194	7.2	1,967	1.0	6.2
	Total	23,369	117,287	140,656	10.1	13,985	1.7	8.4
Southern Outside	5/16-6/12	4,234	11,518	15,752	9.6	1,641	2.6	7.0
	6/13-7/10	2,943	11,708	14,651	6.7	2,200	1.3	5.3
	7/11-7/31	1,152	6,827	7,979	4.9	1,645	0.7	4.2
	Total	8,329	30,053	38,382	7.1	5,440	1.5	5.5
Northern Inside	5/16-6/05	1,943	2,315	4,258	7.6	563	3.5	4.1
	6/06-6/26	2,977	4,139	7,116	9.1	779	3.8	5.3
	6/27-7/17	3,626	4,679	8,305	5.9	1,401	2.6	3.3
	7/18-7/31	1,691	3,022	4,713	5.5	851	2.0	3.6
	Total	10,237	14,155	24,392	7.2	3,381	3.0	4.2
Southern Inside	5/16-7/03	6,804	8,369	15,173	7.7	1,978	3.4	4.2
	7/04-7/31	4,017	5,815	9,832	5.2	1,895	2.1	3.1
	Total	10,821	14,184	25,005	6.5	3,838	2.8	3.7

Because the Alaska Department of Fish and Game receives federal funding, all of its public programs and activities are operated free from discrimination on the basis of race, religion, color, national origin, age, sex, or handicap. Any person who believes he or she has been discriminated against should write to:

O.E.O.
U.S. Department of the Interior
Washington, D.C. 20240